Rs. 2.00

SCIENCE FOR VILLAGES

lding a Bridge between the Science Lab and the Village Mudhut

~~No. 65,~~ Feb. - 1983, Monthly, Annual Subscription Rs. 15/- (10 Dollars) Individual and Institution Rs. 25/- (15 Dollars).

Food Science & Technology Information Service
28 APR 1983
I., MYSORE

~~604~~ FD-36

TECHNOLOGY AND TENSIONS

Scientific knowledge, the knowledge about the environments in which man is living, has been increasing with every generation. This tempo has accelerated with the successive advents of drawing scripts, drawings, printing press, photographs, films, electronics etc. Through these, one generation could pass on its experiences in greater details and precision to the next. Knowledge, thus, was got multiplied faster and spread amongst more people All knowledge about the outer physical world called 'objective science' was utilized for his own advantage by man through his 'subjective requirments'. Thus science —the knowledge is value neutral but the application of scientific knowledge—the Technology is not. Man has used technology for his immediate and narrow self interests.

Science and technology have developed at a tremendous rate during the last hundred years The growth of S & T has accelerated the pace of human life. The power and speed, production and consumption, transport and travel, communication and information—its reproduction, storage and retreval arms, and armaments, etc. etc. are ever increasing in a spiralling cresando This increase brings out stresses and strains on all human systems, generating multiple tensions

The bullock cart with its slow motion is not bothered with the high quantum of friction between its axle and the wheels since at six kilometers an hour, this friction is within limits of tolerance and does not produce any heat. But if the same cart is made to run at ten times its normal speed its axle and wheels will burn themselves out. The friction inherent in a system has therefore to be kept in inverse proportion to its speed. Hence if technology runs faster and faster, without at the same time bringing down the frictional levels of the environments in which it acts, tensions develop beyond the levels of tolerance, creating chaos and crisis.

Physical, societal & global levels :

The result is that at his own physical level man begins to lose his balance and develop hypertension and other stress diseases. To cope with tense living man's environment forces him to develop such controls on himself as would keep his equanimity even under heavy stresses. 700 km. per hour jet plane keeps a cushion of 30,000 ft. of air between itself and the earth while a propeller driven 200 km/hr plane moves comfortably at 1/10th of this height. Similarly the spiritual cushion required by man in the technological age has to be much larger than was sufficient when pace of life was slow. Hence the ancient teachings of keeping an attitude of detachment and equaminity under all circumstances is all the more valid at the present times.

At the societal level, we find that there are various inherent clashes of interests present in the

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from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Solar Cooker for a Song : One can have a solar cooker for Rs. 25, a biogas plant for Rs. 300 and a fire-proof house for Rs. 100 per square meter.

These energy saving, economically sound, ultra-modern amentities have been designed and fabricated by the Rural Development Institute (RDI), a research and development organization founded by leading technologists here.

An ordinary village artisan can make these on his potter's wheel as the technology used by the RDI is the ancient clay technology which makes the solar cooker biogas plant and prefabricated fire proof house available at a throw-away price.

The solar cooker consists of a semi-spherical baked clay dis. covered by polymerised aluminium sheets and tripod from which an ordinary blacked coated tin box is suspended at its centre.

(Contact : Rural Development Institute, 1100 Quarters Area, Bhopal-462 016 M. P.).

CSMCRI Plan to make sand dunes bloom : Scientists at the Central Salt and Marine Chemicals Research Institute, have embarked on an ambitious plan for developing the technology to convert India's vast Wasteland of coastal sand dunes into a blooming oasis.

The Plan envisages the use of sea water for growing food crops in the dunes and the saline ground water to grow forests of "Jajoba", a source of oil "guayule" which gives a kind of rubber and an exotic grass that can be used to make paper.

Scientists are hopeful of developing techniques for converting the 8·5 million hectares of coastal sand dunes into economically productive areas

(Contact : Central Salt and Marine Chemicals Research Institute, C. B. Marg, Bhavnagar, 364 002, Gujrat).

A New Bullock Driven Crusher : The KVIC's Directorate of Gur and Khandsari, under S and T Scheme has evolved a new design of bullock driven crusher / (BDC) with the help of M/s Kisan Krishi Yantra Udyog, Kanpur. The BDC incorporates in itself revolutionary changes in the crushing technique. With a set of three rollers having different dimensions in the upper and lower halves and refeeding technique, the crusher is able to effect double crushing in the same unit extracting a considerably higher percentage of juice than the existing improved crusher under low capacity dry milling technique suitable to rural areas. Whereas the old crushers were reported to give a juice extraction of about 50 percent on the weight of cane, the New crusher was found to give an extraction of more than 65 per cent juice.

(Contact : Shri N. Gopinathan, Director, Gur and Khandsari, K and V. I. Commission, Irla Road, Vile Parle (W), Bombay-400 056)

Cycle Ambulance: A 'cycle ambulance' for use in the villages o carry patients to primary health centre has been developed by the Central Scientific Instruments Organisation, Chandigarh. It has one stretcher for the patients and a seat for attendant. There is a first aid box. The ambulance which has five windows was found to be economically viable because of its light weight, easy maintenance, pliability on rural roads and economy in cost.

The ambulance has been designed using the commercial rickshaw frame with modified wheel span. It is a three-wheel trolley having a steel pipe for the main frame and aluminium strip for the cover frame to provide reasonable strength. Ordinary rickshaw tyres were found to be strong enough to withstand the weight of three persons. The cover is made of canvas with collapsible window covers and back covers The main advantage is that the speed being less (9 kms per hour) the patient can be made confortable on the stretcher

(Contact : Central Scientific instruments Organisation, CSIR, Medical Electronic Instruments Division, Sector 30, Chandigarh-160 020).

Light Trap : Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, after three years of concerted research, have designed and fabricated a new light trap for trapping nocturnal insects / pests harmful to crops The trap which uses 125 watt mercury lamp effectively controls the gram pod borer and tobacco caterpiller within a radius of 200 metres of its installation.

(Contact : Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, M P.). ●

AN APOLOGY

We are very apologetic for the irregularity in the issues of our journal during the last three months due to pressure of work and we will see that the March issue is also posted soon

– Editor

NATIONAL INDUSTRIES

– Shri J. C. Kumarappa

We have to bear in mind two main principles in economics. These are, concentration of wealth and distribution of wealth.

Centralised industries generally act like centrifugal machines. These concentrate wealth in a few hands. Concentration may be either of wealth or of power. The decentralised industries have the natural tendency of distributing wealth. Therefore, if we do not want, in our society, concentration of wealth, then we must take our the centralised industries. Since what we want is distribution of wealth especially in a poor country like India, we must decentralise the industries.

There is another way of doing it. Russia has done it. They say that they will produce wealth in a concentrated form then distribute it through government. The danger there lies in the concentration of power, and not in the concentration of wealth, as in our country. When wealth has been produced the people who have to redistribute it have the power in their hands. Therefore it is concentration of power or concentration of wealth, both are evils. In Russia there is concentration of power, as against concentration of wealth in America and England. India is a poor country where we have got to produce wealth, and in the process of production of wealth we have to distribute it. So, where we want to produce consumption goods, we should put centralised method of production out of court completely.

Place of Centralised Industries :

There should centralised industries only where they can be in the hands of people who will not have any profit motives or who will not concentrate the wealth We shall have to sterilise the centralised industries of their power of concentrating wealth. How shall we do that? It must be on a service basis. Electricity, transport, communications, post and telegraphs, roads, all these must be on a service basis and must be run by government composed of selfless workers If we want two motor cars or aeroplanes, they must be produced by Government. It may be said that such industries, as are run by government, are very often wasteful. We must condone a certain amount of waste. Concentration of wealth is much more wasteful. All these wars are the result of concentration of industries. Look at the huge amount of wealth that has been wasted during the last years.

If we must have a centralised industry, we can have it only where we cannot help it. It is just like a poison. Even poison is sometimes good. For example, you take quinine. It is a good thing when you take in limited quantities and as prescribed by a doctor. You put a red label to the effect that it is a poison, and you take in small dose. If you want to have a centralised industry that is a poison for the nation you may have it with a red label, and take it in small dose as prescribed by the doctor! Otherwise there is danger. Centralised industries are in their very nature anti-social Therefore, we have got to limit their sphere. How do we limit it? Limit it to cases where society requires their function and the industry itself is of the nature of a monopoly. Take for example, water-supply. We should let government arrange for water-supply. We have to allocate to government things which requires a long-range view.

Costs and Profits :

There are people who talk in terms of cost. They say centralised industries are good because things can be produced cheap. It is not always so. Centralised industries can be used with advantage in the case of public utility concerns, such as Railways, Posts and Telegraphs, Electricity supply, Irrigation, which are by nature monopolistic; there must not be any profit motive, but they should be run on a service basis. When the State undertakes these enterprises the profit motive is eliminated which an individual has uppermost in his mind.

Private individuals are actuated by profit motive. Higher the cost lower the profit & lower the cost higher the profit. This means we cut down cost in centralised industry. The easiest way to do so is to cut down wages, purchase raw materials at a cheaper price and effect other economic savings in overhead charges. Profit is the main motive power. When we are cutting down wages and the raw materials are purchased cheap, then we make one man who organises the industry rich and the other people poor. Thus unequal distribution of wealth sets in.

This is not so with village industries. There is no question of profit, although prices may be higher. There is a return for everybody. That is why we need not worry even though prices under village industries are high and prices under centralised industries are low. All we want to do is to prevent unequal distribution of wealth.

Chinese Convert Rice Husk Into Fuel

Husk, long an unfortunately abundant side product, is being used to fuel rice milling in a Chinese factory and thus free up to 446 tons of diesel annually for various purposes.

As a waste product, rice husk poses removal problems. Burning results in air pollution due to the high ash content. Carting the husk away can be costly as for every ton of rice milled, 400 pounds of husk are produced.

In the Chinese process, though, the husk is used to produce coal gas which then powers the plant. Jia Peiyi, Deputy General Engineer of the Power Province, spent several years designing the mechanism.

Equipment :– The equipment is simple to operate, Mr. Jia says, requiring a staff of only one technician and 15 workers. "No special technique is required and ordinary diesel-engine operators can do the job."

The machinery needs to be checked once a week and overhauled once a year during the off-season for rice crops.

Husk discarded during milling is blown through a pipe to a storage tank on top of a special stove, ensuring a steady supply of husk for gas production. In the stove, husk is kept semi-ignited, at a temperature of 700 to 900 degrees Celsius.

If prevents complete carbonisation, and loss of the necessary gases during combustion, carbon monoxide, oxygen and small quantities of methane are produced.

Every cubic metre of the resulting gas also contains two to three grams of organic matter and half a gram of coal tar. The organic matter could damage and erode machine parts, and the high temperature could greatly reduce, the generator's capacity. This gas is then filtered and cooled as a solution.

In a washing tube, the larger grains of organic matter along with some of the coal tar are washed away, and temperature is reduced to 40 to 50 degrees celsius. The gas then moves on to a two-tiered tower which further reduces organic matter and coal tar content to ·03 grams per cubic metre. The temperature goes down to that of cooled water.

The cooled water coming from the tower and containing organic matter and coal tar is then sent through a pile of ash accumulated from previous washings. The ash serves as a filter for the liquid and clean water results.

The 140-kilowatt generator using this process in Wujiang country, Jiangsu, is the ideal size for a rice milling plant with a daily capacity of 25 to 75 tons of rice, using seven tons of husk. The plant contains devices for husk delivery and supply, gas filtering, cooling and generating, and cinder treatment as well as a power distribution system.

This plant is the first and only one of its kind in China as the practice in rural areas is to use husk for animal feed and cooking fuel. A plant with a daily output of 25 tons of rice can have a surplus of 300,000 to 400,000 kilowatt hours of electricity over one year.

Process :– " First of all, this process turns wastes into valuable energy resources. For one ton of rice, a modern rice milling plant consumes 8 86 litres of diesel, but one ton of paddy husk can replace the capacity of 110 litres to 140 litres of diesel", explains Mr. Jia.

The benefits over a one–yeer period are obvious. ' A rice milling plant with a capacity of 50 tons of rice daily would need 80 tons of diesel annually, but efficient use of the plant's 3,000 tons of husk a year could result in a saving of 375 tons to 446 tons of diesel annually", he says, "This is, of course, quite valuable to energy deficient countries, and to countries where energy and to countries where energy is not a problem as well, since it is far cheaper than petroleum and coal".

"The plant itself, in turn, benefits, "adds Mr. Jia" as the inexpensive energy helps to reduce the cost and thus increase profits." The cost of electricity per watt hour produced through husk burning is 60 per cent lower than electricity generated by diesel.

China's husk–powered milling plant used to consume 70,000 yuan (US $ 36,500) worth of diesel annually. Now fuel costs amount to 10,000 yuan ($ 5,210) a year. The cost per watt hour of electricity has decreased from 0 11 yuan ($ .056) under diesel power to ·02 yuan ($ .01) by husk.

In addition to powering the rice mill, husk is also used to produce electricity for mechanised rice storage, rice piling, repairs and lighting. The Wujiang plant will also supply its surplus power to a nearby granary under construction.

As yet, there are no plans to expand the use of these husk–powered mills or to export this technology. But mali received the design in 1969 and has built two plants in 1970 and 1977, both reportedly operating successfully.

– Zhao Ming

Problem of Shelter

The problem of shelter in the Third World may not be the World's most immediate and highest priority problem but it certainly is the world's most massive and apparently most unsolvable problem.

There is hardly a developing country that is meeting its own housing targets. And as towns-especially the metropolises become ever stronger magnets of people, more and more people are coming to live in slums and squatter settlements. Between 1950 and 1975, the number of cities with over a million inhabitants rose from 48 to 91 in the developed countries. But in the Third World, the number of such cities nearly quadrupled, from 23 to 80. In these cities, anywhere between 20 to 90 per cent of the people today live in slums, shanty towns and other uncontrolled settlements, and in most cities their proportions is steadily increasing.

Even what is called low-cost housing remains accessible only to the middle class, beyond the purchasing power of the majority. The World Bank estimated that income distribution in cities like Bogota, Mexico, city, Madras, Ahmedabad and Nairobi in 1970 was such that 47, 55, 63, 64 and 68 per cent of the total households, respectively, could not afford the cheapest modern house on the market built with modern constructtion materials. The problam of human settlements planning, it is now widely recoginsed, cannot be separated from the overall social and economic context of the society. It is directly related, for instance, to its spatial planning and to its process for employment and income generation.

With respect to housing itself, there is a growing realisation that Government ought not to treat housing as a permanent end-product that has to be delivered to the population but as a process, which for the majority of the population is incremental in nature. The role of the Government then is that of an agency that creates the basic policy framework and infrastructure in a manner that encourages and supports this process.

Building Materials : Planning for building materials in a manner that takes into account the social and economic context of the society is probably one of the most neglected aspects of the human settlements problems. There has been a wholesale, and often inappropriate, adoption of Western materials and techniques-even including the large scale import and use of prefabricated or modular housing units. In the last 20 years many parts of the Islamic world, for instance, have seen increasingly rapid and ill-considered destrution of its architectural heritage. combined often with indifference to, or ignorance of Islamic cultural traditions and environmental conditions of the Middle East. But this disregard for traditional architecture and building materials is not restricted to the Islamic world. It is shared by more or less the entire Third World. As President Nverere of Tanzania said in his 1977 assessment of the Tanzanian economy, " The widespread addiction to cement and ten roofs is a kind of mental paralysis."

Nearly 50 per cent of the world's population still lives in buildings where mud has been used as a major building material and given the rate at which purchasing powers are increasing in the Third World, the majority in the Third World will in all certainty continue to live in mud buildings well into the foreseeable future. The rising prices of energy may take modern building materials even further away from the purchasing capabilities of many in the developing world in the future.

Traditional building materials, on the other hand, offer several advantages. They are cheap; they are readily available; capital cequirements are lower; a house built with traditional building materials can be easily extended as the occupant's income increases; and, such houses can be built in far greater variety as each householder builds according to his choice which creates a far better social, cultural, and psycological environment than that provided by most low-cost mass housing schemes in the Third World.

That traditional building material should be given adequate attention, is widely recognised in the literature and lip servrce is paid to them at many conferences and expert group meetings. But still little is ever done about them. To take a quote form the regional paper for west Asia presented to the UN Conference on Science and Technology for Developpent held in Vienna in August 1979 : " Though there exists rich heritage in design and construction form Handhramut to Nubia, there is very little cancern for these techonlogies that may be within the reach of the bottom 70 per cent of the population of the region. These beautiful structures often decorate travel literature but apparently little engineering attention has been devoted to studying and developing traditional forms."

– **Anil Agarwal**

Rural Health Programmes : A Myth ?

The uneven process of development and the inequitable distribution of resources are major obstacles in improving the health - and lives in general - of the populations of the Third World.

Three groups of infections are widespread in the rural areas of poor countries. First, there are those which are carried in the air through coughing, sneezing or even breathing, such as measles, tuberculosis (TB), whooping-cough and penumonia. Secondly, there are those carried in the faeces like diarrhoeas, amoebiasis, worm infestations and polyomyelitis,. Both groups can be tackled through improving basic sanitation, something which is well within the grasp of most communities.

The third group of infections is more difficult to deal with. It includes malaria, bilharzia (schistosomiasis), sleeping sickness (trypanesomiasis) and filariasis. These diseases - it must be said - are often the result ot efforts to bring about rural development.

The poorest are therefore more vulnerable, while the benefits of development accrue 'nationaliy', which usually means for the national elite.

In addition to the three main groups of diseases (malnutrition, infections and precarious conditions relate to pregnancy and childbirth), rural people have to contend with interventions form outside. These do not necessarily promote local initiative -indeed they often actually discourage it. Examples of these are : nutrition education, food, aid, family planning and 'vertical programmes' against specific diseases.

The idea that undernutrition is mostly, or even substantially due to ignorance about the nutritional values of foodstuffs is fallacious. People in rich countries do not seem to know what is good for them than their counterparts in the rural areas, yet they have less undernutrition.

Studies in East Africa have shown quite convincingly that mothers in rural areas know well which foods are good for their children. They simply cannot afford enough of what they know to be of good nutritional values.

Many people still believe that there is an easy answer to world hunger : take food from those places where it is plentiful and distribute it to where it is lacking, and so they start food aid programmes.

But food is bulky and perishable, which means it is expensive to store, transport and distribute. The infrastructure needed to organize all this can cost more than the food is worth. Like any other form of aid, food aid programmes can be inappropriate and misused, and often act as a disincentive for local food production.

Food-for-work schemes ironically often end up employing people who would otherwise labour on theirs own land, producing their own food. Because of the constant need for food, donor-recipient relationships can be particularly binding. Recipients are easily pressured into taking the 'advice' of the donor because the effect of cutting food supplies would be so immediate. It is true that multilateral programmes have a better record in this respect them the bilateral ones, but they also tend to create dependency.

Family planing is another example of an intervention which leaves the underlying conditions of poverty untouched. The general argument is that undernutrition and its attendant infections result form too many people having to subsist off too little. the family planning solution is to have fewer people, because if the existing population were to have sufficient food, dramatic changes would be needed in land ownership and control over food production.

On the other hand family planning can have liberating implications for the women who practise it (in contrast with the authoritharian overtones it has in some countries). The difference lies in who takes the decision that family planning is necessary. Is it the women themselves ? Or the planners who then train people to persuade rural women that it is necessary ?

Much of problem comes form the vision of administrators, national and international, that rural development is a ' project .' For people in rural areas, it is a 'process'. - (Courtsey : Rural Health)

Equal Bites for women

The findings of a recent nutritional survey in rural Bangladesh suggest that, within households, food is inequitably divided among household members in relation to their nutritional needs. This is revealed in FAO consultant, Alice Stewart Carloni's study of se disparities in food distribution. Women and girls are disadvantaged in comparison to men and boys. This leads to a higher incidence of severe malnutrition among women and girls and excess female infant mortality. These findings suggest that, in order to eradicate malnutrition, it may not be enough to increase the supply of food available to households among the rural poor unless, at the same time, steps are taken to ensure a more equitable distribution of food within the household by enhancing the perceived economic value of females in rural society.

In recent years, techniques have been developed for measuring the distribution of food within rural househelds. Surveys carried out usually focus on the quantity of food of different categories consumed by a household, and the relative share of each category consumed by children of different age groups such surveyes concentrate exclusively on age disparities in food intake while sex disparities are ignored.

Findings from the first round of a survey in Bangladesh showed that per capita, male food intake consistently exceeded that of females in all age groups. Overall, males averaged 1, 927 calories per capita with 1, 599 for females. Among children under five, male caloric consumption exceeded female consumption by an average of 16 per cent. For children aged 5–14, the male excess was 11 per cent; among the adult. child–nea–ring age group it reached 29 per cent. The sex disparity was highest among persons aged 45 years and over, where male caloric intake exceeded that of females by 61 per cent.

What are the reasons for these disparities ? Carloni cites two important factors, food scarcity and the low value placed on women in rural societies. Food scarcity is perhaps the more obvious reason of the two. When the household food supply is abundant its equitable distribution may result in mild malnutriton among some household members. However, when the supply is insufficient, an understanding of the rationale adopted in its distribution among household members is crucial for the prevention of severe malnutrition or death. Little is known at present about households allocation of resources in the face of seasonal scarcity or chronic poverty. However, there is evidence that sex bias in the family allocation of food increases whenever food is scarce.

What do the criteria used in distributing food among the household reveal about prevailing beliefs regarding the relative value of males and females in rural society ? This is the second aspect that Carloni addresses.

The criteria used in the distribution of food among the household members at meals are influenced by cultural traditions, such as the food taboos affecting pregnant and lactating women.

Families are more willing to invest resources (food, health care, education) in sons rather rhan daughters because the parents' security in old age depends on the economic position of their sons. This points to the need ro relate the criteria used in the distribuiion of food among household members at meals to the survival strategies adopted by rural households in allocating scarce resources among family members.

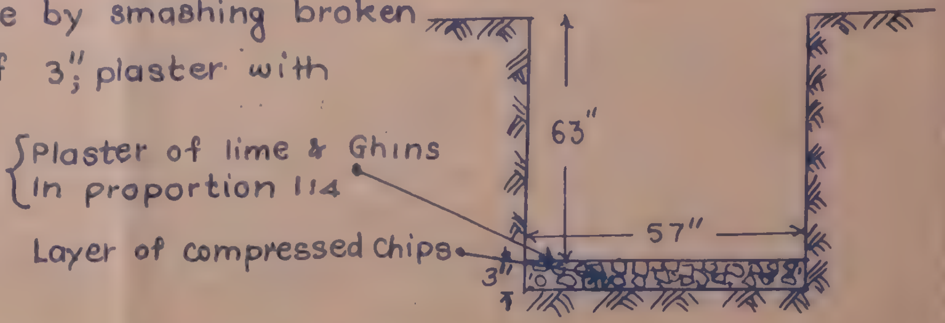
How are these traditional biases to be overcome or moderated ? Carloni stresses that development activities aimed at increasing the supply of food available to households among the rural poor are unlikely to eradicate malnutrition. Steps must be taken at the same time to enhance the social and economic status of females in rural society with a view to improving the distribution of food within households.

(Courtesy - Development Forum)

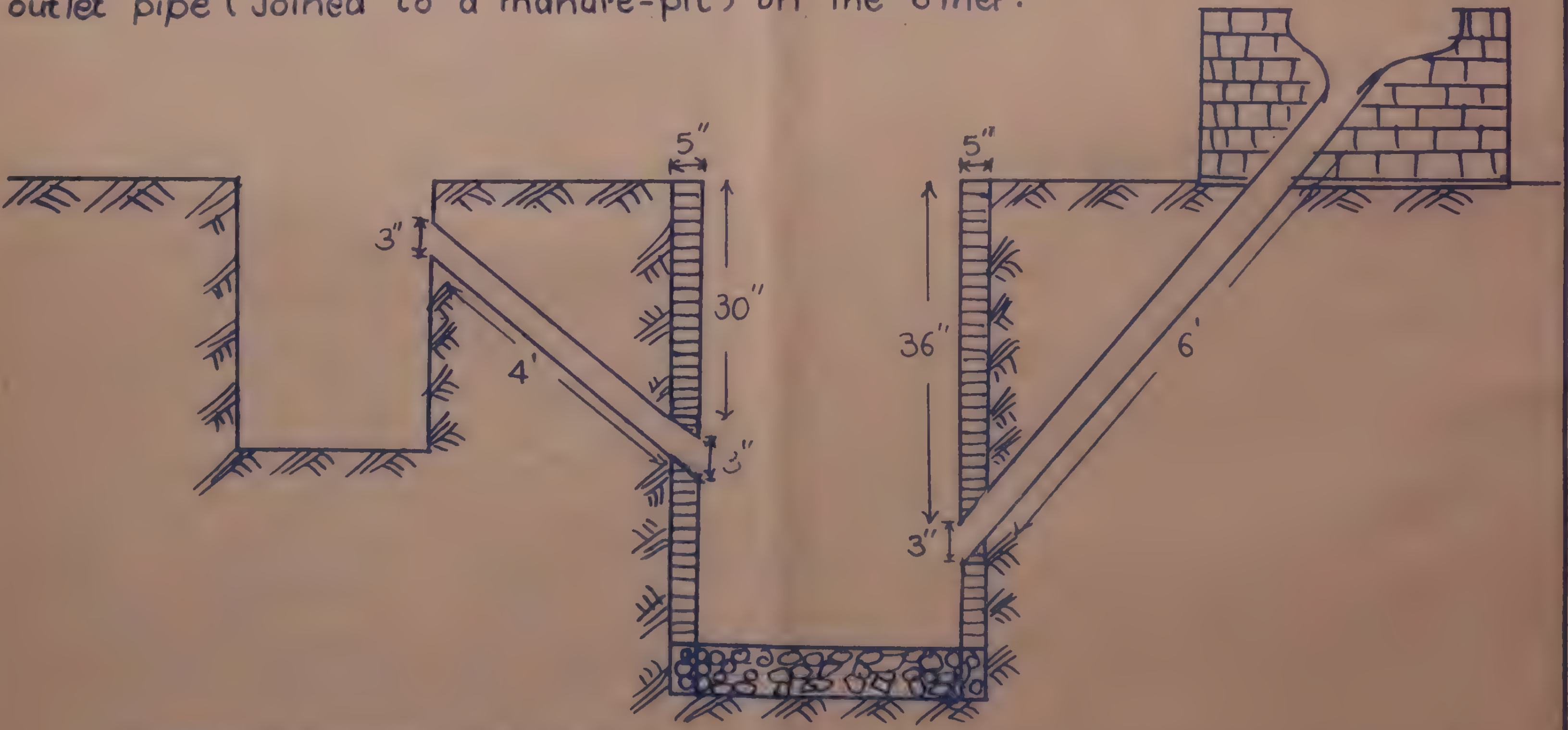
A 600 Rupee JANATA BIOGAS PLANT

(This cheap biogas plant run on 12 kgs. of gobar and human-soil of 5 persons provides 20 cu. ft. gas per day and is designed by Shri Matilal Bera, Bengal)

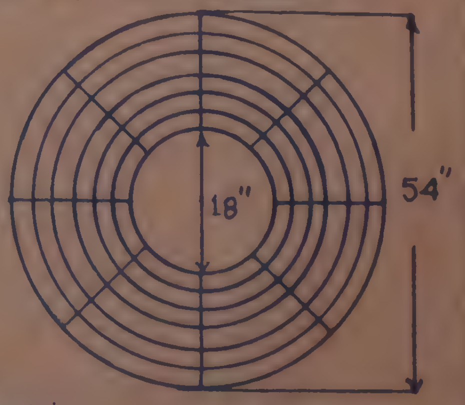
CONSTRUCTION : Dig a pit which is 63" deep and has a 57" diameter. Construct the base by smashing broken bricks and making a platform of 3"; plaster with Lime-pozzolana.



Make the digester (Pit) walls with 5" thick bricks and plaster with lime-pozzolana. Fix the inlet pipe on one side (Joined to a toilet) and the outlet pipe (Joined to a manure-pit) on the other.

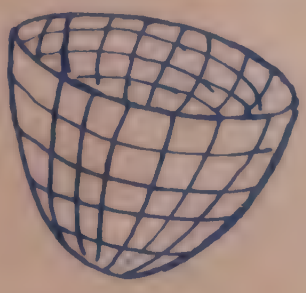


Make a round wire freme to cover the biogas tank, with a set of concentric rings leaving a 18" hole in the middle. Sandwich the wire ring with cement (but for the hole).

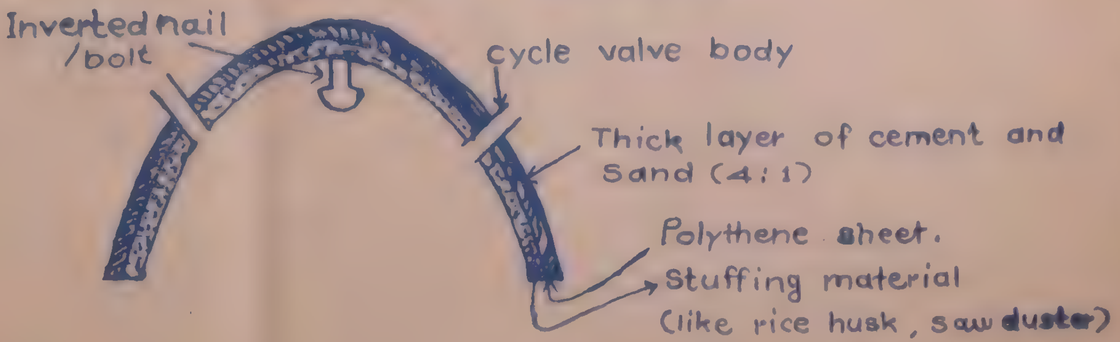


Prepare a 20" diameter wire basket in a similar fashion. spread a polythene sheet inside and fill it with straw and rice husk and plaster it.

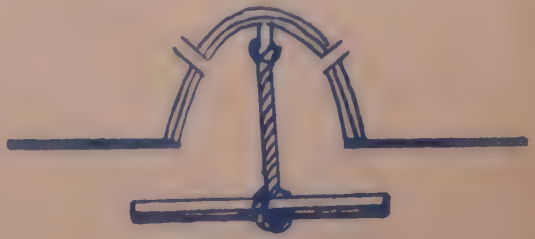
Before plastering insert two bicycle valves for letting the gas out. Hammer a nail (or inverted bolt) inside the roof of the gas dome.



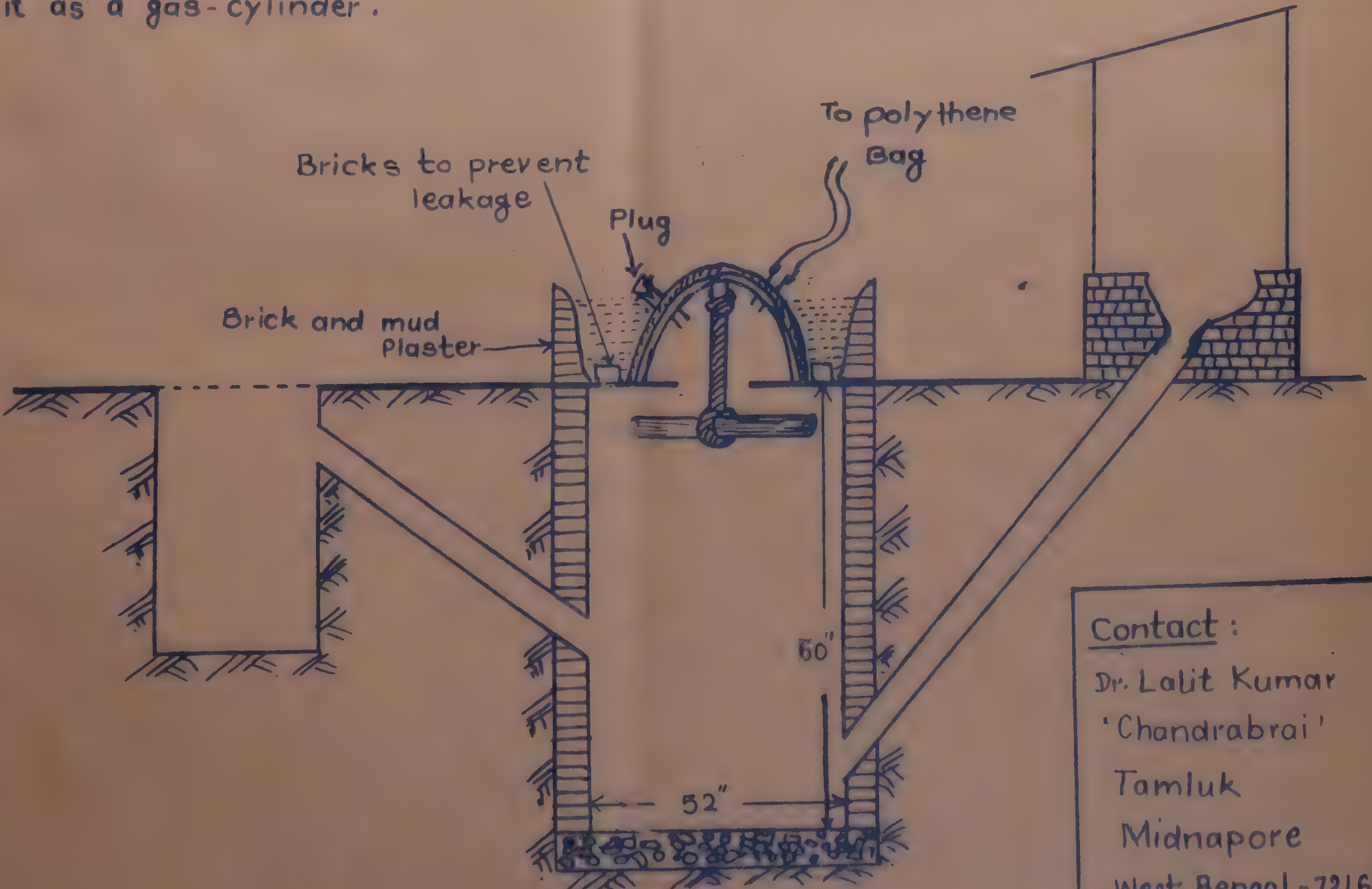
Wire basket


Inverted nail /bolt
cycle valve body
Thick layer of cement and Sand (4:1)
Polythene sheet.
Stuffing material (like rice husk, saw duster)

Place the dome aatop the wire ring and hang a wooden plank to the nail (or bolt) for keeping its weight down. Plaster the joints with pozzolana and fit this total contraption on top of the pit.



Lastly, build a water tank above the plant with mud-plastered bricks, Drop 20 bricks inside this tank to check the gasleakage. Plug one outlet and fit a polythene baloon on the other to fill it with gas and use it as a gas-cylinder.

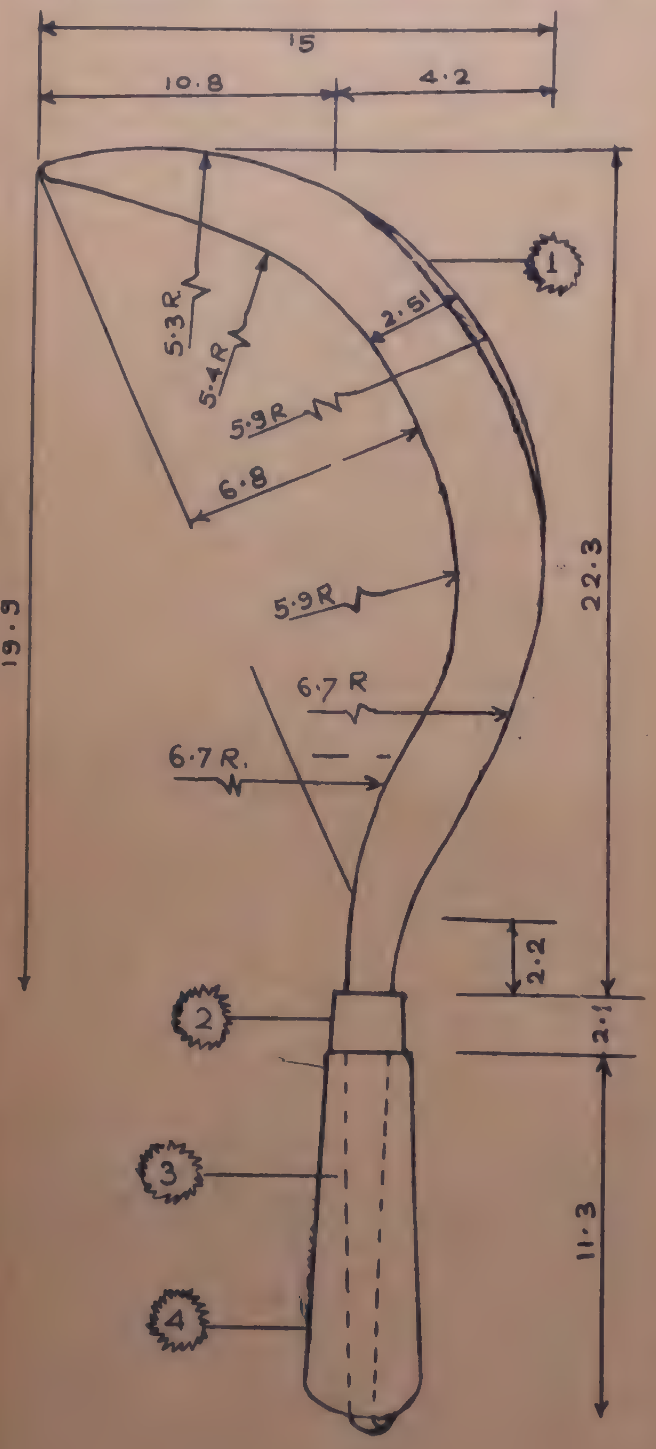

To polythene Bag
Bricks to prevent leakage
Plug
Brick and mud Plaster
60"
52"

Contact:

Dr. Lalit Kumar
'Chandrabrai'
Tamluk
Midnapore
West Bengal - 721636

GAU Sickle A Drudgery Remover

The sickle was evaluated by Regional Research Station and Dry Farming Research Scheme for harvesting wheat crop. The GAU Sickle was 10 to 20% more efficient than local sickle of Dantiwada and Sickle manufactured by Yantra Vidyalaya, Bardoli



1. BLADE
2. FERRULE
3. TANG
4. HANDLE

All Dimensions Are in CM.

Special Features of GAU Sickle.

i) The sickle is made from spring steel. The inner edge having teeth is quenched in 10% ordinary salt water solution. This simple process develops hardness of material five times more than ordinary mild steel used in the conventional sickless Thereby the wearing of the teeth is very less and output of the worker is maintained for a longer period.

ii) The design of the ferrule of the sickle is such that it prevents the loosening of the blade in the handle. Due to the ferrule the handle does not crack. The injury to the fingers of operator does not take place due to absence of rivets. The tang of the sickle is long and passes through the handle. This tang is bent at the outer end of the handle and therefore, the blade does not come out of the sickle.

iii) The shape and size of the handle is such that fingers of the workers have good grip over the sickle.

iv) The sickle is simple in construction and may be manufactured by village artisans. Technique of recutting of teeth is also simple.

v) The sickle is light in weight and thus there is less exertion of the workers during operation.

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WHAT A NUT !

An Energy Nut is dicoverad by the Industrial Finance Corporation of Thailand which gives out a diesel like oil. Test runs with diesel engines driven by the oil of this fuel nut, Jatropha curcas, show that it is similar to normal diesel oil both in engine performance and fuelconsumption. After considerable experimentation Jatropha curcas appears to be the most suitable source for biomasst energy, especially in tropical areas.

The physic nut or purging nut grows on a small shrub or tree (Jatropha curcas) of the Euphorbiaceae family and can attain a height of 7 meters although in arid areas it rarely exceeds 2-3 meters. This tree, which originated in tropical America and West Africa, is found widely throughout Thailand except in swampy and newly reclaimed areas. The tree is also found in tropical areas in many parts of the world due to its natural adaptability to a wide range of soil types, including those of arid regions. This has led to a great variety of names for the plant : thinbankyeksu in Burma, bagberenda and nepalam in India, jarak budeg in Indonesia, tuba in the Philippines and rata endaru in Sri Lanka. In Thailand it is known as sabu dum, see lod, mai yu tei-yu and geing yu.

Formerly, the light oil extracted from the seed was utilized as a fuel and as the raw material for candle fabrication in view of the attractiveness of its soot-free flame. In local areas the soapy-oily latex, which seeps from damaged branches or trunks of the trees, was used as a medicine for stomatitis. However, at present most of these practices are no longer followed and the main use of the tree is now for fencing.

This plant can be grown from seed or, as usual, from stem-cuttings of 45-100 cm which when buried in the soil soon develop roots. Propagation by cuttings is more rapid than by seeds and is usually carried out during the rainy season. Trees planted from cuttings grow to 2 meters and bear about 50 nuts within 8 months, in spite of the fact that it is a perennial plant. The plants begin to yield nuts within 6-8 months and can live up to 50 years. Propagation of this tree has proven to be very simple and cultivation easy, unlike plants such as castor beans which require considerable time and effort to prevent insect infestation.

High-quality oil with a calorific value of 9,470 kcal/kg can be extracted from the seeds. This compares with 10,170 kcal/kg for diesel oil, 10, 600 kcal/kg for gasoline and 6,400 kcal/kg for ethanol. The oil contains Curcasine, which renders it toxic in large doses and strongly purgative in small doses. Thus, cake made from this oil is too toxic for cattle-feed but can be used as a fertilizer.

The oil of Jatropha curcas is readily soluble in diesel oil and gasoline, and no separation of these fuels has been observed even after long periods of storage. In this regard, Jatropha curcas oil can be used in fuel mixtures for gasoline engines. (ASSET, Vol 4, No 9, Oct. 1982)

Ho-ho-ba : Oil that grows on trees : The snag with oil is that only a few countries are lucky enough to have it under the ground. But now it seems a new kind of oil could be produced on a bush.

The bush is called jojoba, pronounced ho-hoba. It grows wild in Mexico's Sonora Desert and produces nuts which contain, on average, 53 per cent oil. "An oil that no other known plant on earth produces", says University of California Professor Demetrios Yermanos, who spotted its potential some ten years ago.

Jojoba plants have the considerable advantage that they seem to thrive in the poor soil and low rainfall usually considered unfavourable for growing crops. The plants can get by, it seems, with as little as three to four inches of rain a year and they positively dislike rich and fertile soil.

About a thousand bushes can be grown in one acre and they are giving 3,000 lbs of seed per year. So great is the demand for the seed that it is currently selling for Dollars 20(Rs. 200) alb. And the oil is fetching a staggering Dollar 200 (Rs. 2000) a gallon-the equivalent of 8,000(Rs80,000) a barrel - compared with petroleum crude at Dollars 31 (Rs.310) a barrel.

The oil is now being used by manufacturers of engine lubricant oil, who claim that it only needs changing once every 32,000 km. And cosmetics manufacturers are using it to produce a wide range of products, including face creams, hair oil and soap.

Professor Yermanos believes that jojoba oil is likely to be taken up soon by the pharmaceuticals industries and he says it also appears to have an excellent potential as cooking oil. "Tests have shown," he says," that you can cook with it up to 24 times." And further research and development could make the oil suitable for turning into petrol. - ('New Internationalist'-Oct - 1982).

SAVE WATER, FEED MORE

The world faces a precarious food future. There has been a loss of momentum in humanity's age-old struggle to feed itself. Per capita production levelled off in the late 1970s as did the expansion of the area devoted to growing food. Population growth will fuel at least a one-third increase in food world demand by the end of the century. There is not sufficient high-quality unuc land that can be brougnt into production to meet this need. Because of much higher yields on irrigated land, farmers must both extend irrigation on to currently rainfed land and intensify production on existing irrigated fields in order to increase the availability of food. Without such irrigation development, food shortages can be anticipated by the end of the century.

Each of the major food-producing countries - the United States, the Union of Soviet Socialist Republics (USSR), China, and India - is considering massive water diversion projects to meet future food needs. These irrigation works are among the largest civil engineering endeavours ever proposed. A seoond group of countries, principally in Asia, is planning to expand its extensive irrigation area. Since many of the world's prime irrigation sites have already been developed much of this irrigation development faces serious problems.

In a number of countries growing competition for water resources pores a major constraint on increasing food production through the extension of irrigation. In the United States and the Sovit Union, where agriculture accounts for three quarters, of water consumption; farmers water needs vie with those of industry and urban dwellers Because of the inefficiency of most irrigation systems, farmers are also frequently in competition with themselves, wasting already limited water supplies.

In addition, environmnental and energy problems arise doubts about the appropriateness and sustainability of many irrigation efforts. Waterlogging and soil salinization are often the legacy of hasty irrigation development. Fragile fish and wildlife habits can be undermined by the extraction of too much water from rivers and streams. Local or even global climatic patterns may be altered by shifting water great distances. And finally, the rising cost of pumping water from shrinking underground reserves is already reducing the profitability of groundwater irrigation.

Building new irrigation systems and massive water transfer projects while dealing with the environmental and energy consequences of their development, will be enormously expensive. As farmers are driven up this rising cost curve, one of the inherent contradictions of large-scale irrigation programmes will become apparent. Ultimately food prices will have to increase to enable farmers to pay new water projects. But raising food prices will make it increasingly difficult for the poor to afford their already meagre diets. Ironically, efforts to produce more food may lead to an increasing number of malnourished persons and higher death rates. Yet failure to increase food production will most certainly result in even greater numbers of hungry people and premature deaths. Thus strict controls to manage food price increases may be necessary both to ensure that farmers have suffieient production incentives and to protect consumers.

As food problems mount, harried political leaders will be tempted to turn to irrigation expansion projects as simple solutions to their food problems. In many cases, an alternative does exist, however. Water conservation- that is, increasing the efficiency of agricultural water use, refining farmers' water management skills, maximizing production on existing irrigated land is often a cost-effective, environmentally sensitive, politically and economically viable approach to increasing food production. Just as society found that the energy it wastes is a reserve of potential supplies, a similar reserve of wasted water exists on nearly every farm, waiting to be tapped.

Such a shift-from supply management to demand management-represents an historic change in agricultural water policies. The huge earth moving projects of the past-building dams and carving canals across the landscape - were designed to mobilize water supplies. They reflecte assumptions that water resources were infinite and that the consequences of their development were negligible. In a world that is increasingly aware of the constraints on water supplies and the fragility of the environment, water conservation is a far more prudent if less heroic approach to irrigation development.

- Bruce Strokes

BOOK OF THE YEAR

The State of India's Environment 1982 : A Citizens' Report

(This unique book is brought out by a keen development journalist, Anil Agarwal, with the help of various Environment concious groups all across India. This report is not a sermon on saving animals or trees but the people of India and the environment they breathe in. It is a remarkable presentation of who controls our natural resources and how not only the physical but also the cultural environment of India is being degraded bit by bit, every day. Following is the " statement of shared concern" on India's environment presented by the Author).

It is false to argue that environmental conservation acts as a brake on economic development. On the contrary, the experience gained in the last three decades has convincingly shown that there can be no rational and equitable economic development without environmental conservation. Environmental degradation invariably results in increased economic inequalities in which the poor suffers the most. Environmental degradation and social injustice are two sides of the same coin. The human condition and the state of the environment are closely related to each other.

The kind of economic and social development we want will ultimately determine whether the environment will be conserved or further destroyed. For human beings the environment is not just a pristine collection of natural entities that must be admired, but it is one vast, complex entity that offers a range of natural resources for their use, for their economic and social growth and to meet their material and spiritual aspirations.

In a country like India with a high population density and high level of poverty, virtually every ecological niche is occupied by some occupational or cultural human group for its sustenance. Each time an ecological niche is degraded or its resources appropriated by the more powerful in society, the deprived. weaker sections become further impoverished. For instance, the steady destruction of our natural forests, pasture lands and inland and coastal water bodies has not only meant increased economic poverty for millions of tribals, nomads and traditional fisherfolk, but also a slow cultural and social death: a dismal change from rugged self-sufficient human beings to abjectly dependent landless, labourers and squalor-striken urban migrants. Current development can, in fact, be described as the process by which the rich and more powerful reallocate the nation's natural resources in their favour and modern technology is the tool that subserves this process.

The resources-use pattern initiated by the current development process is, thus, not just attacking and destroying the environment the wildlife, forests and fishers, for instance–but also the vast majority of human being, especially the poor, and their cultures. A development process that does not care for human life cannot care for human environment or vice-versa. The world's cultural diversity is no historical accident. It springs from the world's biological diversity. And today both stand equally threatened. With each passing day, both the physical shape and the cultural milieu of Bombay nudges closer to New York.

The product-use pattern encouraged by the current development process is such that it is separating people from their immediate environment: the artificial has become the more desirable, the imported environmental misfit has become the more appropriate. This has gone to the ridiculous extent that even such an intimate biological behaviour as breast-feeding is being disrupted by commercial propaganda and mothers, in increasing numbers, are becoming dependent on a supply of multinational milk powder, which is lethal when mixed with polluted water.

As an aggressively high-consumption oriented culture intensifies amongst a well-to-do minority across the world, it is creating a rat race amongst the rest, both between and within nations, to become a part of it. The desire to join this growing, multinational culture is so strong that for most people it has left no freedom to choose. The individual has no alernative.

For purchasing the book contact :

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(2) CSV, Magan Sangrahalaya, Wardha-442 001. (M. S.)

WINDOW TO THE WORLD

A Village Of The Baomboo Water-Pipes : Kepuharjo is a small village in Indonesia where, like many other Third World villages, water was a very scarce commodity. The closest source of water meant a long trek of 15 kilometres. The whole scene has changed now as the villagers get clean drinking water because of the 90 km. long bamboo pipe which they run down the dizzy heights of a near-by volcano, looming like a giant over the 24 villages where 60,000 villagers drink, wash, cook and water their gardens with this "nectar".

The credit goes to a young engineer, Anton Soedjarwo, who decided to work for the villages and thus formed the voluntary group – Dian Desa – which is busy in giving a face-lift to the whole country-side with appropriate technologies or rather 'self-help' technologies. In the case of setting up the bamboo-piping alone, 300 individuals laboured day and night for one year and two months without any monetarily help from anywhere.

(Contact : Dr. Antona Soedjarwo, Dian Desa, Jikaliurang KM 7, P. O. Box 19, Bulaksumur, Yogyakata (Indonesia).

The Amazing Windmills of Miramar : The coastal community of Miramar is located in the delta of the Chira River near Peru's north-western border with Ecuador. One of Miramar's biggest problems over the years has been to provide adequate irrigation. The soil in the region is dry and sandy and rainfall is minimal. Although the Chira River is a prime source of water for irrigation, raising water up to the level of the farm plots has been a problem.

Some 50 years ago, a solution was found for this problem-water pumping windmills A local carpenter and farmer named Sr. Rodriguez (first name unknown) was searching for a solution to the irrigation problem when he came across a picture and description of an old Dutch style windmill. With this as his only guide, and using locally available material, Rodriguez designed and built a wind mill that is uniquely suited to Miramar.

However the early windmills were developed, their construction method and technical aspects remain unchanged and have been passed down by Sr. Rodriguez to his son, Chriestian. Since then, father and son are said to have been involved in the construction of components for almost all the windmills in the region.

The very first windmill Christain's FATHER built is still standing and operating since more than fifty years. And while it and the other machines are made of wood and steel, they were built entirely by hand. Another unique feature of the Miramars windmill is that it does not pump from conventional wells. Instead, farmers channel water from the river through canals to the vegetable plots. A windmill setup in each plot lifts water from the canal to the level of the plot. The towers, he found, are composed entirely of carob tree trunks that are lashed together with strips of leather. The rotor bleds are made of sugar cane stalks cover with a layer of reeds are found in abundance of the peruvian coast and are also used to make brooms. And since rain is infrequent and minimal, the reeds may stay in place on the windmill for ten years or more without rooting.

The bleds are bolted to the metal hub. The diameter of the windmill rotors ranges from 3 to 4 metres. The horizontal axis rotor shaft is generally made from a 2 inch diameter steel rod. This shaft is heated and then bent at one end to form a 'U' shaped crank, to which a wooden pump rod is bolted. The shaft/crank is mounted on a pair of wooden bearing with a simple collar on the shaft to take the wind thrust

The pump is another unique feature of windmills A Carob root, Approximetaly 60 cm. long and 20 cm. in diameter and curved to the appropriate size and shape serves as the piston is made of strips of rubber cut from car tyre from the pumps flap volves. A seamless steel tube, are 8 to 10 inches in diameter serves, as both the pump cylinder and the water delivery pipe. At the bottom of the cylinder is a wooden foot volve made the same way as the piston flap valve, but fixed onto the pipe.

The metal parts for the rotor hub, horizontal axis/crank shaft, and the pump are easily obtained from the scrap yards of the oil fields in Talara and orgnos. The wood for the tower and the cane for the blades are found locally. When any part of a Miramar wind mill is damaged, it is easily replaced. So while many of these machines have been operating for decades they are often replaced gradually, piece by piece.

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Points to Ponder

50,000 Deaths due to acid rain: Respiratory diseases caused by acid rain pollution killed over 50,000 Americans in 1980, a report by Congress's office of technology assessment said.

Acid rain is formed when sulphuric oxides and nitrates from car exhausts and coal-burning factories mix with atmospheric humidity and fall as rain or snow.

According to the report, the number of victims would rise to 57,000 a year by the end of the century if sulphur discharges remained at their present level.

Hindusthan Times,
30th Sep 1982.

Pesticides-How Safe ?: We have been using pesticides thoughtlessly. We use them to destroy household pests, to treat seeds, to preserve grain, to protect crops to preserve books and to guard against malaria, without realising, however, that the pest-killing agent can also surreptitiously take a toll of humans. Like every other calamity, the pesticide deaths and diseases have their largest incidence in the Third World Commenting on the effects of pesticides on human health, Mr Anwar Fazal, President of the International Organisation of Consumer Unions (IOCU) said at a press conference in Bangkok that a minimum of 3,75,000 were poisoned every year in the Third World about 10,000 fatally In Sri Lanka alone there are 15,000 poisoning cases and 1000 deaths annually owing to pesticide ingestion.

Nagpur Times, 1 August, 82.

Asbestos Hazards: The publication in the current issue of an Indian business magazine of a well documented report on asbestos should be an eye opener to all those who are concerned about occupational hazards and environmental safety What the report reveals is truly horrifying. First, just when asbestos processing and use is being placed under stringent regulations in many countries (and when several U. S. and West European firms are on the way to bankruptcy partly on account of the compensation they have to pay to the victims of exposure to the fibre), the asbestos boom in India continues to proceed uninterrupted. In fact, new companies are being set up in India in collaboration with precisely those firms that are going bankrupt in the West. Secondly, despite the known harmful effects of the "magic mineral" asbestosis, an irreversible lung disease, and cancer-neither the use nor the handling and processing of asbestos is subject to regulation in this country. Not even simple warning signs are to be found in asbestos cement or fabric factories which annually produce over 65,000 tonnes of asbestos products or in ports which handle over 80.000 tonnes of imported material a year Thirdly, thousands of workers routinely inhale massive quantities of the killer dust, dockers are often bathed in fibre spilling out of split sacks, and many people who are unaware of asbestos hazards, including children, are regularly exposed to heaps of the mineral lying outside factories or housing construction sites. Fourthly, most Indian asbestos firms carry out on health checks of exposed workers, and where they do, the results are not disclosed to the victims An official agency study showed that between seven and fifty per cent of asbestos workers are affected by dust and fumes

Times of India, Feb. 83.

The Guinea - Worm Menace: The decision of the Union Ministry of Health and Family Welfare to launch a vigorous drive to check the growing incidence of guinea-worm in villages has come not a day too soon. Although not fatal, the disease causes morbidido of a high order A task force appointed by the Government to identify the afflicated areas and suggest, measures to combat the diseaset has confirmed that Rajasthan is the worst hit. Over the years, the disease has spread to other states like Karnataka, Andhra Pradesh, Maharashtra. In some villages in Karnataka, 60 to 70 per cent of the people are afflicted by guinea-worm which is known as "naru" in Maharashtra and elsewhere. Health authorities and the people themselves have not paid adequate attention to the prevention and cure of the disease presumably because, the loss of life caused by guinea-worm is insignificant. But there is no room for complacency, for the disease enfeebles the victims greatly and it cannot be cured easily or quickly.

Metronidazole is currently in use for giving relief to victims from swelling or pain at the point from where the worm attempts to come out. This medicine does not, however, kill the adult worm, which is the root cause of the trouble. Because it is highly toxic niridazole, which was in use before, has given way to metronidazole. The net result is that currently there are hardly any effective curative drugs In the curcumstences, the authorities will have to concentrate on popularising preventive measures Fortunately, this is not too difficult, for guinea-worm is the most preventable among vectorborne disease. The use of water from step-wells, ponds and lakes where water does not flow causes this disease. Construction of walls around step-wells has therefore been advocated by experts in the field, Villagers ought to be induced to use at least filtered, if not boiled, water. Chemical treatment of ponds and step walls where water is static should be resorted to. Appropriate educational drives will have to be launched in areas where the disease is widespread.

Financial Express.

(From Page 1)

structure like that between that of the master and the servant, the ruler and the ruled, the teacher and the taught, the producer and the consumer, the management and labour, and so on and so forth. The tensions between these has been perennially present but they have got accentuated with the increase in the tempo of technology, like the frictions in the machines increasing with their speed. We witness the evidence of this tension increase all around.

The brighter side of this phenomenon may be that this could help in identifying the flaws in existing structure of the society and helpful in finding their causes and evolve such relationships whereby these conflicts of interests could be obviated.

At the global level, human interference with Natural environments has created greater and more complicated problems and tensions. Thousands of species of plant and animal life have been oblitarated and man instead of being a preserver of nature's balances has become a destroyer of life in its multifarious forms as the various inbuilt balances in Nature are being disturbed.

Take for example the case of Carbon Dioxide in the atmosphere, Earlier when earth was young, at one point in its history it has begun to put forth vegetarian at a tremendous speed The proliferation of green follage ate up the carbon dioxide present in earth's atmosphere – and got it stored as carbon in the vegetable kingdom. This sudden arrest of carbon reduced the content of CO_2 in the atmosphere to a very low level. And as CO_2 is the insulator which keeps the earth warm, its reduction lead to a cooling of the globe and the polar ice caps spread forth towards the tropical latitudes These ice ages by suppressing the vegetabions under ice, stopped further depletion of CO_2 from the air. After millions of years the CO_2 balance in the air got restored and it is the trapped carbon in the fossil fuels of these ages that we have as coal and petrol. Now, however, a reverse process is going on. The burning of this fossil fuel on larger and larger quantities is bringing more and more CO_2 in the air and the creation of greater insulation of the earth is thereby leading to hither temperatures of the planet. Like this there are many a system which are getting disturbed due to the speeding up of technological applications and leading to tensions of various kinds.

Ends & Means :

These are few of the areas symptomyzing how technology has created more tensions and problems. The reason for these is that we have not changed the old structures along with the changes in technology that we have applied to them

The need is that such new structures are simultaneously formed as are comparatively free from frictions. It is necessary that the conflict, inherent in the situations that prevail is drastically reduced. otherwise the use of greater power and speed will heat up the world to dangerous levels Unfortunately the *structures* have not changed with the speed at which *techniques* have changed. Similarly attitudes are not changing to the extent circumstances have changed. The level of spirituality has not developed to the extent science has developed. It is, therefore necessary that this pairs go hand in hand, otherwise tensions grow in proportion to the distance that separates them and this ultimately leads to crisis for all time. Unless human attitudes deepen and widen, taking the integrated totality of space and time into consideration the physical powers that man acquires through Science will lead to his annihilation. It is high time we rectify the direction of science and technology and take it towards the above spirit. Only then these tensions will begin to recede.

How to reduce tensions :

To put the whole thing succinctly the following are the points suggested to reduce to reduce the tensions developed due to technological changes :

(1) To have a clear realization that with the technological advancement alone without commensurate sociological and psychological changes, the development of the human civilization will remain unrealizable.

(2) The circumstances favourable to the physical existence of man, in one respect alone are not necessarily the ones that are good for all people and for all times. A few people may benefit at the cost of other people for a longer period of time, a larger number of people may get the benefits for a short period of time at the cost of interest of generations to come But all the people cannot get the benefit for all the time unless the system evolved is scientific and non-violent.

(3) Thirdly if the humans seek to get benefit from the natural environments for there short range greeds without regard to other species and destroy flora and fauna, they themselves will be destroyed.

(4) There are reserves of minerals in the earth's crust which are non-renewable and yet these have been destroyed and consumed by the present generations Thus misappropriating of the trust which was meant for all the coming generation must be stopped.

(5) As in the case of a high speed vehicle the system to reduce friction through mechanical efficiency and lubrication is much more sophisticated so also in the case of a highly technological society the societal frictions should be drastically reduced to by non-violent systems. The lesson is that sustained technological advancement is possible only in a tensionless society.

Devendra Kumar

Cover pages printed on Hand Made Paper : Printed and Published by Devendra Kumar on behalf of Science for Villages, Wardha. Editor : Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha-44201. Printed at Majestic Printing Press. Nagpur. Regd. No. WDA-119

Rs. 2.0

SCIENCE FOR VILLAGES

ling a Bridge between the Science Lab and the Village Mudhut

, 64, April/May - 1983, Monthly, Annual Subscription Rs. 15/- (10 Dollars) Individual and Institution Rs. 25/- (15 Dollars).

Food Science & Technology Information Service
24 JUN 1982
C.F.T.R.I., MYSORE

FD-30

INDUSTRIALISM & INDULGENCE

Gandhiji pleaded for a life of self-control as against that of self indulgence He stood for limiting one's wants as opposed to ever increasing wants The era of industrialization, however, has a different logic. It requires for its factories to go on increasing production so that the consumption level of the products of industries also goes on increasing

When coal was used for steam power harnessed for production in factories, the industrial age came into being By the beginning of twentieth century, petrol became the booster of production in industry. Now this petrol and coal age is reaching its point of exhaustion and the search is for atomic power to take its place. All mineral wealth, however, is limited and non-evenly distributed The struggle to keep control of their deposits is going on, since without cheap motive power mass production for world market is not possible.

The avarice of man may goad him to do things which are on the face of it unethical. Still he does need a psychological support for his actions in some philosophy which would rationalize what he is doing. In the case of expanding markets and conquering and subjugating other people as well as saturating markets and creating new wants in the industrial age he also required a moral support.

The need of consumerism indulgence had also to be given a logic This was extracted from the the Friend's Studies in human psychology Like the half truth taken out of context in the case of Darwin, Freud's thesis that denying an individual fulfilment of his natural desires creates complexes in him was stretched to plead for and justify ever increasing wants being met by ever increasing production Indulgence became a norm of life and all limits to needs were discarded as this was the need of industrial production.

Man has developed four kinds of needs or desires. Firstly the necessities secondly the luxuries, thirdly the habit forming vices and lastly the destructives arms and armaments for defence.

Necessities are those the fulfilment of which is necessary for keeping the efficiency of the person. The food, the cloth, the house and various other articles that we need, without which the effectivity of our functioning gets reduced are such which must be available to all and no quantities as is essential and optimum. When reducing the wants to the minimum is the ideal, this minimum should not go below the optimum. It will be wrong to give up the shoe if you have to tread over land where your feet need protection and warm clothes where it is cold. We have to progressively determine our optimum and reduce this optimum. But the aim is to have a fuller expression and not to become a recluse.

Luxuries : are articles which add to the comforts of body but are not in any way adding to the efficiency of output There may be a thin line between necessities and luxuries increasing the quantum of necessities themselves becomes luxuries which has to be guarded. Each generation becomes used to more and more comforts as greater amenities become available due to industrial production These amenities however do not necessarily benefit the individual or the society by making it more efficient.

Habit Forming Vices : are the next step towards indulgence. The increasing consumption of intoxicants like alchohol, tobacco etc. comes in this category. The consumption of such articles is posi-

(Contd. on Page 16)

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

BIOMASS RESEARCH

In view of the recent fuel crisis, due to the depleting fossil resources as well as the limited supply of fuelwood, the national Botanical Research Institute (NBRI) Lucknow, initiated, a few years ago, a R&D programme on biomass for raising experimental fire, alcohol and petro-plantation as also for producing single cell algal protein from sewage. The NBRI took the lead in this field when a Biomass Reserach and Training Centre, sponsored by the Department of Science & Technology was up in early 1981. A brief account of the R&D work done and that proposed is given below :

1. **Woody biomass for fuelwood :** Twelve fast-growing firewood species, selected on the basis of their growth performance on alkaline soils of Banthra are being evaluated for their biomass yield potential and suitability of combustion.

Realising the need for a low technology to the use of fertilisers, fast growing leguminous species, indigenous as also exotic, have been included in the study to assess their nitrogn fixing capacity.

2. **Biomass for alcohol :** The biomass based alcohol fuels are an attractive proposition on current yields and conversion efficiencies. Therefore, some of the major sugar and starch crops, such as sugarbeet, sugarcane, tapioca and sweet sorghum are being evaluated. Five high yielding tapioca strains introduced from the Central Tuber Crops Research Institute, Trivandrum, have been successfully established.

Sixty six strains of sweet sorghum have been introduced from the international Crop Research Institute forSemi-Arid Tropics (ICRISAT) Hyderabad to evaluate their biomass yield and sugar percentage.

3. **Biomass for Hydrocarbons :** Petro-plants – The Department of Science & Technology, Government of India has sponsored a coordinated project entitled Introduction, screening and utilisation of potential petrocrops and their conversion to petrolum hydrocarbans. Under the scheme, forty-five of the identified species have since been screened for their hydrocarbon contents. Biomass production and evaluation experiments have been started on selected six species.

Copaifera langsdorfii : Copaifera langsdorfii is known as the oil tree of Brazil and is reported to yield a sap which can be directly fed into a diesel engine. Seedlings of this plant have been raised at the Institute from seeds procured from Brazil.

Jojoba : The work on Jojoba (Simmondsia chinensis (link) Schneider) a source of high grade lubricant was started in 1978. Clonal propagation of plants by tissue-culture technique and their satisfactory transfer to soil, have been affected. Regeneration of plants by grafting has also been possible.

Guayule : Guayule (Parthenium argentatum linn) is another hydrocarbon yielding plant. It grows well in arid and marginal lands and is an alternative source of natural rubber. The plant was successfully introduced at the NBRI in 1978. Since then regular seed collection and raising of plants have been going on.

4. **Aquatic Biomass for Single Cell Proteins :** NBRI has developed a biotechnology for cultivation, in raw sewage, of Spirulina platensis a multicelluar, filamentous, planktonic blue green alga, which grows abundantly in brackish soda lakes and ponds in Central Africa and which has long been a part of tribal food there. The alga is an excellent vegetable protein (40-45%) and is a rich source of vitamins, pigments, minerals and trace elements. It is now in use as a health food in USA.

The objectives of the work on this alga are the total utilisation of sewage for algal biomass production for animal food, pisciculture and water for irrigation, as also to minimise environmental bazardes and maximise ecological benefits. A prototype production unit, with an exposed surface of $450 m^2$ has been standardised and the biomass is being tested as a high protein, high carotene poultry feed supplement.

(Research and Industry, December-1982.)

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WORK AS RELIGION

One of the things that distinguishes man from beast is religion. By religion people generally understand ceremonial worship. If a man is truly religious, his every action should declare the glory of his Maker. Ordinarily understood, religion occupies only a little fraction of man's waking hours. Most of his time is spent in work Practically all his thought is concentrated on it and his life consists of what he does. This being so, work is even more consequential than ceremonial religion. We may almost say that work is the practical side of religion. To deny man his opportunity to work is therefore to deny him the privilege of being a full-fledged human being if religion differentiates man from beast. Looked at it this way, work denied to man is like denying him entry into a temple. Economically, the unemployed are like the untouchables in society. Both stages are equally degrading to man. Banishing unemployment is like throwing open the doors of a temple to everybody.

A little clear thinking will show that from a practical point of view the function that work plays in society is even more important than that of ceremonial religion. It is easy to profess to love God in the abstract, but it is difficult to show one's love of God in one's everyday dealings with one's neighbour. The first represents the ordinary conception of religion and the latter the real function of work. If we do not love the brother we have seen, how shall we love God whom we have not seen ?

From this aspect, work is, as already said, even more important than ceremonial religion. But work has not always been looked upon as sacred.

Analysis of Work :

When we analyse work we do not find it a curse in itself. It has two important components– (I) the germ of growth, i. e. an element which makes for the development and happiness of the individual and (2) drudgery. Just as any seed may have the pericarp and the starch and even as any balanced diet needs both the concentrates and the roughage to make it wholesome, work needs both its component parts to enable one to benefit by it. As the saying goes, genius is one per cent inspiration and ninetynine percent perspiration. Without the perspiration or drudgery the inspiration cannot become effective. One has to have both to benefit by it. The drudgery parts of work is essential to enable one to grow through work. A musician has to practise hundreds of hours on his instrument before he can perform on the stage.

Before a person becomes a scientist he has to labour for years in a laboratory and cultivate a sense of smell which will appreciate sulphurated hydrogen. These are inevtiable. Therefore, there can be growth only when the pleasurable part of work is combined with the drudgery. One who avoids drudgery will not gain by the pleasurable part only. Though one may enjoy it for a time one will begin to deteriorate after a while. When properly used, work itself functions as an outlet to the personality of the individual, it gives expression to that which is highest in man and develops his faculties. Whatever ideals, principles or religion a man may adhere to are reflected in his everyday work. The reaction on the individual is perhaps much more inportant than the work done because it goes to develop human personality and thereby contributes to human progress.

Naturally, the drudgery part of work being unpleasant, human nature being what it is, there is always an attempt to avoid it or shift it on to some one else. But as no one is willing to take on drudgery for what it is, becomes necessary to use coercion. If we set out merely to enjoy life, we shall have to force someone else to take up the drudgery part of work at the threat of the taskmaster's whip. Western nations made no attempt to overcome this divorce of the pleasurable germ form the drudgery part of work.

On the other hand, they definitely set out to glorify the pleasures of life which in itself means enslavement of others. It was on such a philosophy of work that the ancient empires of Greece and Rome worked, shifting the unpleasant part of activity, by which pleasure can be had, on to the captives made into slaves. Similarly, during the feudal day the lords got drunk and serfs laboured. It was a sign of distinction to enjoy without working. Again, under the financial regime, the capitalist and the executives enjoyed at the cost of the factory drudge. When we come to the political age we see empires enjoying at the cost of their colonies The whole of this system is based on violence no nation can shift its drudgery to other nations and convert them into "hewers of wood and drawers of water".

–J. C. KUMARAPPA

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FIRE RETARDANT TREATMENT OF THATCH

A SIMPLE AND EFFECTIVE TREATMENT OF THATCH ROOFING FOR PROTECTION AGAINST FIRE HAZARDS AND INSECTS

Cemicals Required :

1. Fertiliser grade Diammonium Phosphate – 99·95% (by weight)
2. Sodium Fluoride – (0·05% by weight)

Diammonium Phosphate acts as a fire-retardant chemical and Sodium Fluoride as an insecticide and fungicide.

A. Impregnation of Thatch :

1. Prepare a 14% solution in water of fertiliser grade diammonium Phosphate and Sodium Fluoride prepared in the proportion indicated.
2. Dry the grass and leaves in the open so that the moisture content is not more than 12-15%
3. Immerse the material in the chemical solution thus prepared and leave to soak for 10–12 hours. Soaking is to be deemed complete when a chemical loading of 10-14 % by weight of the thatch (dry basis) is attained.
4. Take out the material, drain excess impregnating chemical solution and again dry in sun by spreading it out. The moisture content should be 15%.
5. Prepare thatch roof in the conventional manner employing the impreganted material and using similarly impregnated bamboos and wooden poles for the frame-work and vertical supports respectively. Such roofs do not catch fire and worst come to worst, fire spreads extremely slowly.

Method II

If the chemicals stated in the first method are not available then another combination of chemical mixture that can be used for the treatment of thatch is as follows :

Coper Sulphate – 1 kg.
Boric Acid – 3 kg.
Zink Chloride – 5 kg.
Sodium dicromate – 6 kg.
Water – 20 Gallons.

1. Dry the leaves grass and bamboo in the open till the moisture content is reduced to 12–15 %
2. Mix the Chemicals in a drum or a container which is not used for drinking water storage or animal feed.
3. Immerse the leaves, grass and bamboo in the Cemical mix. In case of grass the Chemical dipping period should be 32 hrs. and for Palmora leaves – 48 hrs. It is important also to treat the bamboo to which the thatch is tied along with the grass and leaves.
4. Dry the chemically treated thatch in the open till the moisture content is reduced to 15 percent.

Note : One kg. of chemical mixture is sufficient to treat 10 kg. thatch (grass or palmora leaves). Two persons can treat 2 to 3 tons of thatch every day.

Preparation of Mud Plaster :

The soil used should neither be too clayey nor too sandy. It is preferable to use wheat-bhusa (chopped and crushed wheat stem), 4 lbs of which should be used for every cubic foot of soil The soil and bhusa should be well mixed and the mixture kept wet and kneaded every day for about a week This increases the work-ability and ensures the proper rotting of the bhusa.

Test for suitability of the plaster by applying it over the well in small patches. If it does not crack on drying, the plaster is suitable. If it cracks, then stop its cracking by adding little sand.

Preparation of Cut-Back :

100 lbs of bitumen (80/100 grade) should be taken, warmed and the molten bitumen poured in 20 lbs of kerosene oil slowly, while keeping the whole mass well stirred for 5 minutes after the whole of bitumen has been added. It is preferable to keep the whole mass stirred for a longer peried after all the ingredients have been added to ensure thorough mixing and proper product.

Preparation of Non-Erodable and Water-Proof Plaster :

For every 1 cu ft, of the soil used in preparing mud plaster, 4 lbs. of cut-back are added and mixed by turning over the mud plaster with shovel and kneading it.

The mud mortar is applied over the top surface of roof with the mud plaster having a minimum thickness of 12 mm over the thatch roof. The average thickness of mud plaster may be increased to 20 mm for proper finishing. Plaster the thatch from below with a 10 mm thickness coat of mud mortar.

After the plaster is completely dry it may have some shrinkage cracks These are filled with mud plaster. Two coats of gobri-wash (1 part gobri (cow dung) and 1 part soil mixed with 4 lbs of cut back) are applied over the entire roof surface on top and are allowed to dry for 24 hours The well-dried roof surface is further applied with one coat of bitumen cut-back either by brush painting or sprayed through a sprayer, as may be convenient. After this a white lime-coat is applied. The thatch roof thus made is waterproof and fire retardant.

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THE CASE FOR MUD

If the 600 million houses required by the end of the century were to be built in a single row, they would go around the circumference of the Earth nearly a hundred times.

– It is unlikely that even half these houses will be built with modern building materials such as bricks, cement and plastics. Traditional building materials such as bamboo, wood, soils, grasses, lime, various types of local pozzolanas, stone, cloth and animalskins will, therefore, continue to be used.

– Already, the majority of urban households in the Third World *cannot afford to purchase even the cheapest modern house.* In the rural Third World, this proportion is probably well over three quarters of households. If the world economy continues to worsen in the 1980s, and cement and brick prices fuelled by rising energy prices continue to rise, the small proportion of households who can afford modern housing will become even smaller.

– It is, therefore, important for housing planners to *stop paying lip service* to traditional building materials and to start using them.

– Of the various types of traditional building materials available, *mud is the most widely used* and will remain so, long into the foreseeable future.

– *Over half the Third World's population now lives in mud buildings* of one form or another Different societies have used mud in different ways, and have given the technique many names.

Mud and other traditional building materials can make an important contribution to the pressing housing problems in developing countries, the reasons being the following :

- easy and wide *availability*
- *low cost*
- suitability for *labour-intensive* construction techniques
- construction techniques using traditional building materials are simple, so *no sophisticated equipment* or expertise is required.
- people are already *familiar* with these techniques and materials.
- they can be handled by *local people* and are thus amenable to self-help housing construction.
- materials like mud are *climatically suited* to the needs of developing countries
- they require *less energy* in manufacture than modern building materials such as cement
- well used they are *aesthetically pleasing*, and assert cultural identity
- they can *release scarce modern building materials* for important development projects
- their use reduces the demand for *foreign exchange.*

Advantages and disadvantages of mud:

Mud, as a building material, has the following advantages :

- It is *cheap*, and in most parts of the world, it is readily available – one reason why it is so widely used.
- It provides excellent heat insulation, so inside a mud building is *cooler in summer and hotter in winter* than a building made with steel and concrete.
- It is strong in compression (i. e. difficult to squash) and so *makes good walls.*

– But mud also has some serious disadvantages :

- It is *eroded easily by water*, which makes its use difficult in areas with high rainfall or possibilities of flooding,
- It has a low tensile strength (i. e. is easy to pull apart), which means *mud roofs are difficult to make.*
- It is susceptible to mechanical damage. *Rodents* can easily make holes in mud walls and under the floor, or *thieves* can dig their way into the house.
- **Mud does not grip wood properly**, so gaps often develop around wooden doors and windows in mud walls. Consequenty, mud houses often have few openings and are badly ventilated. Where walls are made of reinforced mud, wattle plastered with mud, or sundried mud bricks, this problem is not so severe.
- **Mud soaks up water** and becomes very heavy. Consequently. wooden beams supporting a mud roof being to sag, the mud cracks and the roof starts leaking To reduce sagging of beams, many villagers in the states of Uttar Pradesh and Punjab build very narrow rooms, across which even a bed cannot be kept. But even these rooms tend to leak in heavy rains.

– Most of these disadvantages can be overcome by suitable improvements in design and technology :

- **Stabilisation**: other materials (e. g. bitumen or cement) can be added to mud to improve its strength and resistance to water. This technique is known as soil-stabilization.
- **Architecture** can be used to enhance the advantages and reduce the disadvantages of mud. Narrow streets and closely packed houses can produce a cool environment in a hot region, and overhanging roofs can reduce erosion caused by rain.
- **Structural techniques**, too, have been used to enhance the characteristics of mud For instance, in several parts of the world, walls of earth are traditionally made by ramming successive layers of earth between shuttering, which makes a wall that can take the weight of the roof.

(*Excerpts from "Mud, Mud"– a book by Anil Agarwal*)

WATER PURIFYING SEEDS

Detailed practical guidance for the choice of sites from which wholesome surface water can be drawn as well as for water purification is given in the famous treatise of the Indian sage, Sushruta. His work is believed to be based on the divine teaching revealed to the holy Dhanvantari, the greatest of all healers who offers the ambrosia of immortality to the Gods. The oral tradition may go back to several centuries B. C. However no written documentation of the "Sushruta Samhita" exists before the beginning of the first century A. D. (Bhishagratna 1963). Among the "seven modes of purifying water" Sushruta teaches that muddy water should be clarified with a "natural coagulant" such as kataka seeds (Strychnis potatorum) and he recommends the disinfection of contaminated water by heat. This can be done by exposing it to the sun or immersing red-hot iron or hot sand in it. Later, water purification even became a subject for Indian poets and moral philosophers.

A hundred years later the Indians themselves took up experimental work on these seeds (Subaramiah and Sanjiv Rao 1937), but a detailed research programme with a series of publications and extending also to other natural coagulants was first introduced by Bulusu and his collaborators at the National Environmental Engineering Research Institute (NEERI) in Nagpur. Since the first publication of Sen and Bulusu (1962) the clearing nuts have entered international literature on water treatment under their Hindi name "Nirmali seeds" which indicates their ability "to remove dirt".

In parts of India, water from rivers or pools which is both muddy and evil-smelling is mixed with wood-ash from the sal-tree *(Shorea robusta)* and then filtered through cloth. The procedure may be repeated until the water looks clear and no longer has an offensive smell. Buddhists and Jains cover the vessel in which water is drawn from a well with a piece of linen through which the water filters (V. Hinuber, Pers. Comm., Dubois 1906)

In Southern Kerala wiry roots of the rhizoma from the "ramachham" (Malayam) : *Vetiveria zizanoides* are laid in a clay jar which has a few tiny hols in its bottom. Water filtered through this layer of roots is not only clearer but also acquires a pleasant smell.

Coagulant dusted on water surface : Dusting is mainly carried out with plant ashes, earth from termite hills (Southern Darfur), paddy husks or crushed seed coats from, for example, "elachi" (Hindi) : *Elettaria cardamomum* (Southern India), Stirring improves the effectiveness of clarification.

Coagulation with mucilagenous material and thick paste : In Central India, *Strychnos potatorum* seeds or substitute "clearing nuts" like the seeds of *Semecarpus anacardium* (Hindi : "Bhela") are rubbed on a stone and made into a thick paste which is immersed in the turbid water.

Coagulant rubbed on bottom of vessel : In Tamil Nadu villages the classic Indian "clearing nuts" (seeds from *Strychnos potatorum,* Sanskrit : "kataka", Tamil : "tetankottai") are still rubbed for several minutes against the bottom or wall of an earthen jar before it is filled with muddy water from a tank or a river. This type of application has already been described by Europeans centuries ago.

Indicator fishes for wholesome water : Some people in Maharashtra believe that turbid waters can be made clear for a small area around fishes such as "garodia" *(Ophiocephalus punctatus,* also known as "channa" and the Indian major carp *(Catla catla,* Bulusu, Pers. Comm.).

Introduction of higher aquatic plants : In Northern Kerala, Lotus, like aquatic plants called "Kolattamara" in Malayalam *(Nelumbiumsp)* are introduced into ponds and wells polluted with animal wastes. Water drawn from such a source is considered to be clearer than before and to have lost its bad smell and taste. Similar practices are found in the Madras area.

Purification of ponds and wells with plant materials : A similar treatment is carried out in Tamil Nadu with pieces of wood from the "amla" (Hindi) : *Phyllanthus emblica.* Apart from being clarified, the water is given a pleasant, sweet taste (Monanty, Pers Comm., of also Dastur 1977).

Purification of water holes and wells with ashes and soil materials : In Kerala burnt coconut shells are thrown into wells of evil-smelling, polluted water. A single treatment requires 4-5 coconuts.

Plant material for cooling : In India and some parts of West Africa it is believed that the tiny roots from *Vetiveria zizanoides* or *V. nigritana* cool the water if they are put in the bottom of the water jars. Similar effects are attributed to the bark of *Ficus umbellata* which is used in Senegal and Mali and called "ndab" or "mambia" (Wolof) and "adake" (Peul) (cf. also Conf. rep. from Mali, Maystre 1977).

Plants added to water : Some of the plants which are traditionally used to perfume water or which are believed to make it cool and calm, cnotain bioactive substances which can kill bacteria or fungi. Extensive screening of tropical plants with modern methods has not yet been carried out, although in India experimental work in this field started early. According to classical Indian medicine, it is understood that some of the "deodorisers" which "destroy, remove or hide offensive or fetid odours" are antiseptics or disinfectants. Among plant materials which are used to scent the water, the leaves of the "Holy Basil" of the Hindus *(Ocimum sanctum)* have been demonstrated to contain a volatile oil with-antibacterial and insecticidal properties (Wealtb of India 1962). In Ayurvedic medicine, basil leaves ground with water are applied to bad boils and an infusion of the leaves in children and adults (cf. also Nadkarni 1976). These uses might be understood as a result of the germicidal action detected in that oil.

Among plants claimed to perfume and to "cool" water are the roots of the "Indian Sarsaparilla" : *Hemidesmus indicus* (Sanskrit : Annantamul). Another extract of these roots has an inhibitive effect on *E. coli* (Wealth of India 1962). Infusions of the root bark are used to cure fever, skin diseases and chronic cough and diarrhoea in children. An antifungal substance, "Isopimpinellin" has been isolated from lime leaves (Citrus aurantifolia, cf. Jahn 1979 a).

NATURAL COAGULANTS FROM THE LEGUMINALES INDIA

Species	Name in English
Phaseolus roxborohii	black gram
Cajanus indicus	pigeon pea
Lens esculents	lentil
Dolichos fabeformis	
Dolichos catiang	cow pea
Pongamia glabra	Indian beech
Acacia catechu	black catechu
Capoaris spinosa	caper tree
Semecarpus anacardium	marking nut tree
Mangifera indica	mango
Annona squamosa	custard apple

("Traditional Water Purification Tropical Developing Countries")

Dear Reader,

This article is rare find as the importance of pure drinking-water (minus chemical purifiers) is continually growing. We are sorry for the sprawl of too many technical names in there. We wauld be greatful if you could send us some popular names of the few water-purifying seeds in your locality or anywhere in India for that matter.

Awaiting your feedback,

— **Editor**

THE BURING ISSUE

Papua New Guinea Alcohol From Sago: A plan has been drawn up to produce energy from natural palm forests in some areas of Papua New Guinea. The energy potential of nipa and sago plam forests in the lowland swamps is considered enormous.

As a first step in sago energy production, Papua New Guinea is constructing an alcohol-from-sago factory. The factory will have a capacity of 2 million litres per year and is expected to be commissioned shortly. (The Colombo Plan Newsletter)

Philippine Fruit As Fuel: President Ferdinand E. Marcos of the Philippines has ordered the immediate propagation throughout the country of a tall, fruit-bearing tree-Pittosporum resiniferum.

The petroleum nut tree (Locally known as 'Bangilumbang') normally grows to a height of 30 metres and starts bearing fruits upon reaching six to 12 metres. (approx. 5 years after plantation). The tree fruits twice a year and a single tree yields about 400 nuts in each fruiting season or 120 to 140 cans (five Gallons). A kilogram of whole fresh nuts (with orange coloured pulps) gives about 70 gms of oil when pressed. The oil burns in an open dish with a very smoky flare which reaches 300°C. Each nut can burn for about 15 minutes and can be used as a substitute for kerosene lamp.

It is claimed that five trees planted in a rural backyard would produce as 300 litres of fuel per year for household use. Some 250 to 380 trees can be planted over a hectare of land on any type of soil. —(Eco Development News)

Sri Lankan Energy Tree: Aleurites moluvanna, a tree growing abundantly in Sri Lanka, can be an important source of energy according to studies completed by the Sri Lanka State Timber Corporation. It is said that nuts from one tree can yield between 5 to 10 gallons of oil per year. The nuts can be crushed and used as a substitute for fuel-wood. This tree was being used as an energy source in earlier days but with the advent of kerosene, its wood was being used only for packing.

(The Colombo Plan Newsletter)

Weeds May Give Motor Fuel: Australian scientists have identified certain weeds which have the potential to become a source of cheap motor fuel. Two most promising weeds are Calatropis procera and cryptostgia grandiflora. These are tall shrubs commonly known as rubber vines or milk weeds and grow in many warm countries. They contain a latex-like substance which is partly hydro-carbon and can be converted into crude oil through a simple process. About 12 tons of crude can be produced from a hectare of weed plantation. A private Australian firm is setting up a pilot processing unit for the production of crude oil from these weeds in Darwin, the capital of the country's Northern territory.

Truck Runs On Plant Juice: Experiments in using the juice extracted from a native plant Jatropha curcas to fuel diesel engines have been successful, according to a Japanese expert, Dr. Yosifu Takada— a Colombo Plan expert. A four-cylinder Isuzu truck driven on roads in the outskirt of Bangkok to test the synthetic fuel attained a speed of 100 km. per hour. He said the truck would reach 140 km. per hour if tested under proper conditions. The engine required no modifications. The carbon monoxide emitted was low and the engine started easily.

(Further reference in Science for Villages No. 65 Feb. 83)

Ho-ho-ba: The bush is called jojoba, pronounced ho-ho-ba. It grows wild in Mexico's Sonora Desert and Produces nuts which contain, on average, 53 per cent oil. About a thousand bushes can be grown in one acre and they are giving 3,000 lbs of seed per year. The oil, is now being used by manufacturers of engine lubricant oil, and cosmetics.

Schmoo: The Divine Tree: Schmoo tree grows to a height of 65 ft. in five years in the poorest soil. Its leaves and tender pods can be used as vegetables: its seeds can be ground and the flour used for making bread. Vietnamese use the leaves for preparing curry of sauce and the tender pods for making candy. Schmoo harvested each year from one hectare of land contains 2500 kg. of potassium as well as calcium and other minerals. A kilo of its dry wood produces 4550 calories of heat. One kilogram of its charcoal generates 7000 calories of heat which is 70 percent of the heat given by fuel oil. Those who want to try, will be supplied with five seeds free of cost if they send a self-addressed unstamped envelope and one rupee (to cover the postage and cost of pamphlets) to Shri Nautamlal C., Tejpa Collage, Wadi, Rajkot-360001.

Energy From Weeds: In conjunction with the Belgian government. Kenya has initiated a year-long project to select the best natural forms of euphorbia which Kenyans have for years used as hedges, and has carried out pilot experiments on turning the weed into hydrocarbons and charcoal briquettes. The government has selected a type of weed that yields 80 tons of dried material per hectare, and thrives in semi-arid and arid-lands. Each hectare of weed would produce 20-30 tons of charcoal annually (up to 8 tons of the hydrocarbon). The project would allow Kenya to produce its own energy and generate a technology that it could sell to other developing countries. (For details refer: New Scientist, London, Vol 91, No. 1269, 3rd September 1981; P. 6001.)

FIRST YOU SLICE YOUR BAMBOO

When Krishan Shukla tried to drive a bamboo pole into the ground to build a tubewell, he was laughed at by his fellow villagers. The standard well bore is made of iron pipe But Mr. Shukla could not afford the pipe and he needed the water. The small pond from which he used to draw water had dried up and the only other source of irrigation in the area is tubewells. If he had his own tubewell, he could hire a pump by the hour from a richer farmer, a custom now prevalent all over India.

Mr. Shukla's invention has now prospered beyond his dreams. There are 17,000 bamboo tubewells in his home district of Gonda in Uttar Pradesh, each costing only about a third as much as the iron equivalent. Some of the pipes go down 100 feet or more, of which only the top 15 feet or so are of cast iron. The rest is bamboo, in 10 or 12 foot sections sleeved and tied up with coir twine. The pipes have not been in long enough for their durability to be certified. But local wisdom has it that if a bamboo is cut when green and not allowed to dry, it outlast iron. And never rusts.

In May, 1978, a voluntary organisation, the Deendayal Research Institute, adopted Gonda district, with its 2·5 m people, 85% of whom are illiterate, for a crash programme of economic and social change It chose tubewell irrigation as its spearhead because the district is wholly agricultural, and has no other source of irrigation, but is exceptionally rich in sub-soil water. The government gave liberal subsidies, banks extended low interest loans, and the institute provided the organisation and the workers

Today there are 10,000 pumping sets in Gonda, each servicing four or five well bores. The going rate for hiring a pump set is 10 rupees. A cultivator who has only three or four acres pays less for his water than the interest he would pay, even with a government subsidy, on a loan to buy his own pump set. A pump set including the engine costs at least Rs. 5,000 and pays its way only on 10 acres or more.

Having reduced the costs of boring a tubewell by two-thirds the institute is now trying to eliminate the pump engine, because electricity and diesel are often not available and are always expensive, especially in remote areas like Gonda. Local mechanics have tried running water pumps with a pair of bullocks and a variation on the traditional bullock-driven Persian wheel. This combines the advantages of animal power and a sealed source of water instead of the traditional open well, and produces flow of water almost as plentiful as an engine-driven pump.

The principle is simple Bullocks go round at the same speed as in a traditional well, turning the main wheel about two and a half times a minute. This movement is geared down by stages to turn the shaft of the water pump at 1,500 revolutions per minute, the same speed as a 5-horsepower engine. Because the gears are too heavy, the bullocks and the water slow down after a time and men have to add a push But this will not be necessary when purpose built gears are available.

The economics are also sound. A pair of bullocks and a modified version of the old tackle costs as much as a 5-hp electrical or diesel engine. But there are no recurring fuel costs and bullocks have no complicated repair and maintenance problems. A hired pump set costs more per hour than the cost of feeding and stalling the bullocks for more than a day. Most Indian farmers who have even a few acres of land own a pair of bullocks. Most bullocks are far from fully employed. They soon may be when this innovation catches on.

(Source : The Economist)

ELIZABETH EDDY

पढ़िये !

पढ़िये !

पढ़िये !

गरीब की झोपडी और राष्ट्र की आधुनिक विज्ञान-प्रयोगशालाओं के बीच सेतु का काम करनेवाली हिन्दी की पहिली पत्रिका –

"ग्रामोपयोगी विज्ञान"

इस पत्रिका में आपको मिलेगी –

- देश और विदेश की प्रयोगशालाओं में गावों के विकास में सहायक होनेवाली खोजें ।
- नई तकनीकों की सचित्र जानकारी जिनको गांव में नये उद्योग और विकास लाने में लागू कर सकें ।
- गांव की समस्यायें और उनके तकनीकी हलों के सफल प्रयोग ।
- विज्ञान के क्षेत्र में ग्रामोपयोगी चिंतन ।

वार्षिक शुल्क : 5 रुपये (व्यक्तिगत) **10 रुपये** (संस्थागत)

ग्रामोपयोगी विज्ञान केंद्र, मगन संग्रहालय, वर्धा–442001 (महाराष्ट्र)

POINTS TO PONDER

SEASONS & HEALTH IN RURAL AREAS

For pastoral herders, the difficult time of year is the dry season when there is little water for their animals. For the majority of rural dwellers, however, the worst time of year is the wet period between the beginning of the rains and the end of the harvest, Food is short, food prices high, cash reserves low, and agricultural work hard. Tropical rains encourage the breeding of disease carriers like mosquitoes, as well as the spreading of fungal and backterial infections, Diarrhoea is widespread after rains have washed faeces into unprotected water supplies Malaria, Guines worm, dengue fever and skin infections are most prevalent during the rainy season. Food is easily infected with bacteria and fungi in moist, warm conditions. Weakened by hard work and lack of food, people are less resistant to disease.

Women and young children are particularly vulnerable. Rural women tend to stop breast-feeding as the rains come, so infants may have a less nutritious diet at this time Since a large proportion of conceptions occur in the months following the harvest, many women are reaching the end of their pregnancies when the rains come, Having to work at this stage is unhealthy for them and dangerous for the unborn child.

The rural poor bear brunt of the seasons. They need to be able to work to secure food for the future; the landless labourers must earn wages when work is to be found. This is the time of year when the poor become even poorer. If food runs out, or if there is sickness in the family is forced to sell assets or fall into debt.

Little is known about problems related to the wet season, since most rural health surveys are done during the dry season, when travel is easier. Health workers trained in the urban areas will have little idea of the reality of seasons Some of the measures to reduce the effect of seasons on health are well known, although many of them bring problems of their own, Irrigation reduces dependence on a single rainy period. Migratory labour can increase reserves for the wet season, but its benefits do not obviously overweigh the drawbacks. Other valuable measures include seasonal creaches for children whose mothers have to work, and any techniques which reduce women's unpaid drudgery, such as fetching water Increasing awareness among health workers of the effect of seasons, as well as stocking up rural clinics in anticipation of bad times, may also help.

RURAL HEALTH
(Ideas & Action No. 145 '82)

GUNS Vs BREAD

GUNS

Total Defence Budget
—Rs. 4,200 crore

Production loss of HAL since 1972
—Rs. 662 crore

Cost of one Jaguar Plane
—Rs. 8.0 crore

Cost of five MBT tanks
—Rs. 25 crore

Cast of one submarine
—Rs. 108 crore

Cost of two IAF helicopters
—Rs 2 4 crore

Cost of serving 800 aircrafts each year
—Rs. 200 crore

Cost of 1,000 jeeps and trucks used by the Army
—Rs. 100 crores

Investment in abandoned Projects
—Rs. 35 crore

Recurring expenses on 46 defence laboratories a year
—Rs. 100 crore

BREAD

The cost of providing one-room pucca homes for one fifth of India's population.

The cost of constructing 2.5 lakh family size biogas plants,

The costs of providing two exercise books to over five crore school-going children.

Cost of providing a primary school to over 12,500 villages.

Cost of giving 200,000 villages clean drinking water.

Equal to one year's salary for 12,000 school teachers

Market value of one million crore of wheat which could feed the fifth of India's population for ten days.

Cost of providing 2 lakh high efficiency 'Balwan' bullock-carts to Indian farmers which would help solve problem of rural transportation,

Cost of providing 5 million sun-baskets (for cooking food) to the energy-starved villagers of India.

Cost of twenty 500-bed hospitals,

ENERGY - A FEMINIST ISSUE

Energy is a woman's issue. It is an issue at the subsistence level where women supply that bulk of human energy for survival tasks. It is an issue in modernizing societies where energy-saving technologies too often undercut women's work. It is an issue in industrial societies where women influence consumption patterns. For development is largely the substitution of more efficient energy for human energy. Different development paths affect women differently, but since they all focus their visions on the national level they have tended to obliterate the differential impact of their policies on different household members and so have historically often added to the daily burden of women rather than relieving it.

Human energy is particularly a woman's issue since much of women's time and effort is consumed by economic activities which have typically gone uncounted in employment statistics. Only recently have there been careful village level time-use studies of the actual distribution of work in the household on such survival necessities as fetching water and fuelwood, processing and preparing food, and engaging in market activity. Casual surveys and anecdotal references to such activities have tended to create as much misinformation as did the previous practice of ignoring informal market and income-substituting activity.

In particular the recent explosion of interest in village use of firewood has produced exaggerated estimates both of consumption patterns and of collection time for many parts of the world. Further, land degradation and erosion were blamed on firewood collection practices. More refined studies suggest that forests are being cut for commercial timbering and for subsistence agriculture. Further, it appears that stemwood of logs are more often used for small industry than for domestic use which tends to utilize twigs, dead branches, or agricultural refuse. The fuelwood shortages are real in many places, of course, but the most pronounced shortages are among the poor in urban areas of the developing world. The reality of shortages impacts directly on women's time and energy since they are the primary users and generally the major collectors of fuelwood.

For all the emphasis on collecting fuelwood, woman generally spend much more time in food-related activities while the fetching of water also takes more time than collecting fuelwood in most developing countries. Together these strenous activities consume a woman's energies and help account for her undernourishment. Relieving such burdens could as readily redress her food deficit as the provision of greater amounts of food. Clearly, it is essential to have correct data on energy use before proposing alternative solutions.

Human Energy in Subsistance Economy: The primary energy shortage in subsistence economies is human energy. The poor, around the world, work very long hours for very little return. There has been a tendency for observers to assume that the rural poor are underemployed because they have focused only on a few of the multifarious activities undertaken by poor women and men, and children every day, The problem is the definition of work. Most of the tasks which poor families must do to survive are outside the monetary economy and so are overlooked by most economists and statisticians.

How easy it is to assume underemployment is illustrated by a recent survey of energy expenditures in six villages in southern India. Reddy found that the average time spent per household per year on agriculture was less than four hours a day. If he had stopped there his figures could be used to botster the under employment argument. Instead, he calculates the human energy utilized for domestic survival activities and found that the total energy used by the same family was 18.67 hours per day. That figure still does not include 16 to 52 days per household per year spent on work in village industries.

The problem is not that the rural poor are under-employed but that they are under-productive. For all their long hours of work. they barely meet survival needs; their energy goes into (1) powering the agricultural productions cycle and (2) feeding and watering both humans and animals that contribute to that cycle. Reddy has shown that 82% of the energy used in subsistence agriculture in South India is contributed by human or animals, at about the level of 40% for humans and 60% for animals.

Women among these rural poor, work longer hours than men. Reddy's study, referred ro above, shows women working 9.69 hours/day as against men's working 5.68 hours/day on agriculture and survival tasks alone.

This study is an almost complete census of energy consumption in six villages; 560 of the 578 households in these villages were surveyed from September to December 1977 utilizing a careful pre-tested schedule. As is typical in India, there were slightly more males (28%) than females (26%) in the total study population of 3,452 persons. Average family size was 6.24 persons; nearly half (46%) of the population at the time wa- under fifteen years old.

These villages are relatively homogenous with 84% of the households engaged in farming on their own land; further 78% of the households are of a single farmer caste. Nonetheless, there are inequities in land-holding patterns with about 12% of the households landless, 30% with less than 2.5 acres, 31% holding between 2.5 and 5 acres, 20% between 5 and 10 acres and 8% over 10 acres. This large farmer category owns over one-quarter of the available land.

Household income levels clearly affect women's energy output For example, while firewood is the primary fuel source, only 71% of the households in this village cluster depend upon gathering it themselves; another 8% procure wood from their own land while the other 21% of the households purchase their wood. Those households that gather wood spend about 2·14 hours per day per household picking up twigs and fallen branches. In contrast, households that purchase or fell trees tend to use logs. Dung is not typically burned in this area, nor is agricultural refuse a major alternative to firewood.

In those households which gather wood, the task is divided among all family members although the women still do the most gathering. The length of the trip taken obtain firewood varied significantly among the villages, as did the proportion of households buying wood. Clearly. villagers weigh the time it takes to collect a "free good" against the cost of buying firewood. The poorer families do not have that choice. Average time spent by family members in those households which gather firewood are shown in Table II. The number and length of trips taken togather firewood shows that it is not a daily activity (Table III), This intermittent nature of collection may help account for the inaccuracies reported in less detailed studies.

Women in the better-off households have very little responsibility for obtaining firewood. It is generally the men cutting their own wood who spend time in felling trees, Neither men nor women are presumed to spend much time in obtaining firewood in those households constituting one-fifth of the village which purchase firewood. The fact that poor households rely upon children to collect about two-fifths of the firewood impacts upon their ability to attend school. Other studies show that it is primarily the girls who do this work, and so are more likely to drop out of school than are their brothers.

TABLE I

Human Energy (in Hours/Household/Day) for Domestic Agricultural Activities :
Average for Six Villages in Southern India

Activity	Men	Women	Children	Total
Gathering firewood	0·57	0·66	0·46	1·69
Fetching water	0·04	1·24	0·25	1·53
Cooking	0·03	3·65	0·34	4.01
Carrying food to farm	—	1·82	—	1·82
Livestock grazing	2.85	0·75	1·95	5·55
Total domestic	3·49	8·12	3 00	14·61
Agriculture	2·19	1·57	—	3·76
Total	5·68	9·69	3·00	18·37

TABLE II

Human Energy Spent on Survival Activities in Southern India
(in hrs, of activity by household members)

Activity	Men	Women	Children	Total
Collecting firewood	·72 (33 5)	·84 (38·9)	.60 (27·7)	2·16
Cooking	·03 (·7)	3.68 (91·)	·32 (8·1)	4·03
Carrying meal to fields	—	1 82	—	1·82
Fetching water	·05 (2·9)	1 23 (80·7)	·25 (16·4)	1·53

TABLE III*

Human Energy Spent in Fetching and Gathering in Southern India*

	Average number of trips in an hr,		Average distance travelled in km.		
	per day	per year	round trip	per day	per yr.
Fuel	·39	142	5 4	2·1	766 8
Water	2·08	759	·38	·79	288 5

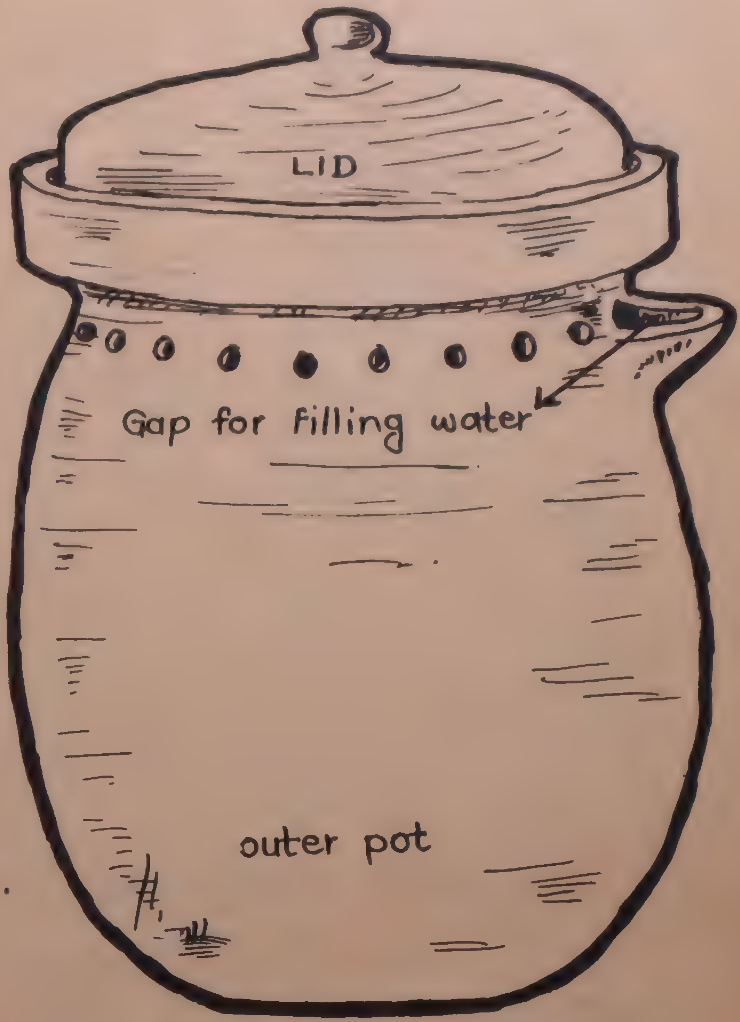
(Contd on Page 17)

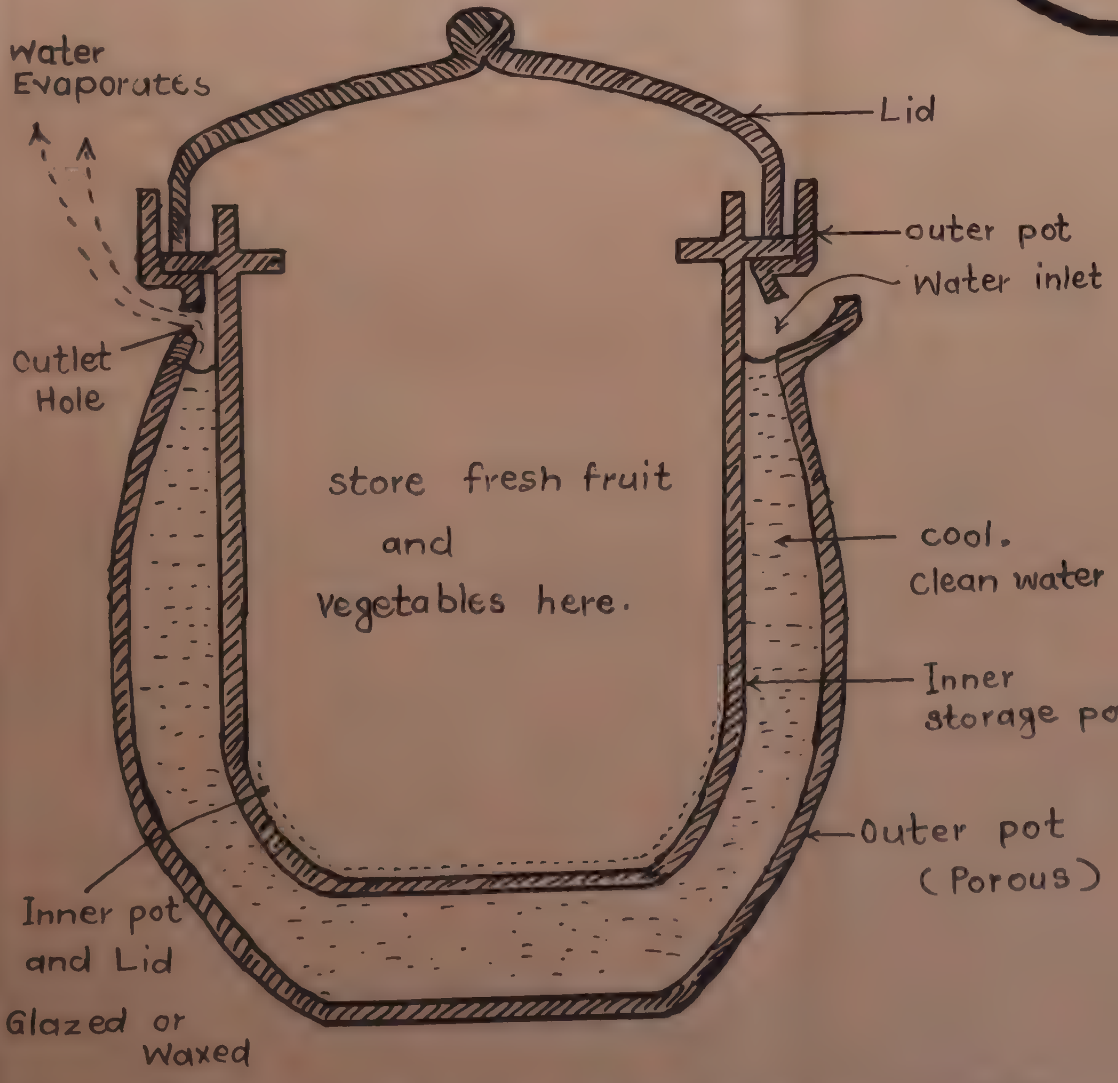
SHITAL POT

How it works: evaporation of~~w~~ water causes a cooling effect. The heat of the day. causes water in the outer pot to ~~the~~ evaporate and escape through the holes below the rim, as well as through the porous pot itself. This action cools the inner storage pot and its contents.

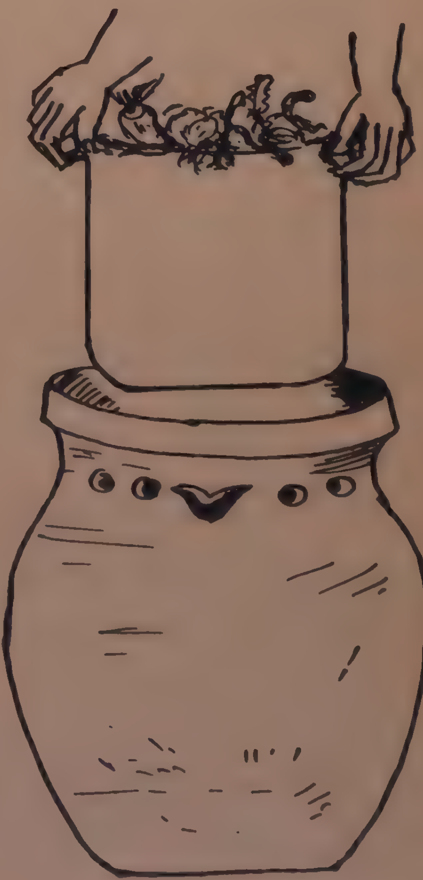
Important :

1. The water used must be clean.
2. Top up the water at least once a day. If the pot is left without water, the inner pot will heat up and the fruit and vegetables will rot. 3. The water should be changed daily. 4 Keep the pot out of the sun. The heat of the day will allow the water to evaporate.
5. Only store fresh fruit and vegetables. Clean inner pot often.


LID
Gap for filling water
outer pot


Water Evaporates
Lid
outer pot
Water inlet
Outlet Hole
store fresh fruit and vegetables here.
cool. Clean water
Inner storage pot
Outer pot (Porous)
Inner pot and Lid
Glazed or Waxed

WHAT THE SHITAL POT LOOKS LIKE CUT IN HALF



SOAK-PIT

May it be a village, a shanty town or the outskirts of a big city – all such places lack sewage drains and proper sanitation system The water coming out of the village house and wells collects in a muddy pool nearly and is a popular breeding spot for mosquitoes and other fellow insects.

The soak-pit is a simple, cheap pit to avoid such germ-banks and keep the environment clean With a little care this pit can run for 15–20 years without choking. On an average, the pit next to a house can soak up to 100 buckets of water and the bigger pit near a well up to 200 buckets per day. The soak-pit operates very efficiently in all kinds of soil except the rocky ones.

Material Required :

Big, medium and small stones; gravel or thick sand; mud; jute-cloth or jute-bag, an old mud pitcher discarded tin-box; coconut fibres or dry grass ; Jamun or Palm branches and an open 1½ ft. long tin-pipe.

Soak-pit for a Well :

Dig the soak-pit lengthwise for a well; as it is filled in a manner different from the soak-pit constructed for a household.

Soak-pit for a House-hold :

(1) Dig a pit exactly below the exit of the household drainage (the dirty water from kitchen or bathroom). It should be one foot away from the wall.

The pit is 3 ft. long by 3 ft. broad and 2½ ft. deep. It is 3 ft deep at the far end to attain a gradual slope for the smooth flow of water.

(2) Select three sizes of stones for filling the soak-pit – large (Papaiya-sized), medium (Guava-sized) and small (lemon-sized) Fill the pit with large stones upto height of one foot, topped up by medium sized stones for the next foot, and lastly by small ctones for the last one foot, Keep little space between stones rather than crowding them for quick filtration of drain-water.

(3) The exact spot where the drain-water falls into the pit, is marked for placing a 'cleansing-pitcher', later. Clear up a one foot broad and one foot deep cavity in the stones for this pitcher. Place a big boulder in the void (to be replaced) later by the 'cleansing-pitcher)'.

(4) Now cover up the pit with Jamun or palm branches (Jamun, palm branches do not easily rot in water). These branches should be placed across each other.

This simply means that the first layer should be facing East-West and the second North-South. Remember to leave the 'cleansing-pitcher' space uncovered.

(5) Take old jute-strips or jute-bag and cover the branches with this bag or cloth. Then, repeat the criss-crossing of branches on top of this jute-layer.

(6) Wet the mud (dug out of the pit), fill this clay in a basin. And then throw it with grat force on the branches so that a thick clay layer completely covers the pit'.

(7) Form a 3-4" thick layer of gravel atop the mud layer. Now remove the big boulder and replace it with the cleansing-pitcher,

(8) The Cleansing-Pitcher :

Take an old mud-pitcher. The diameter of its mouth should be big enough to allow the passage of a 2 kg tin-can pierce five big holes in bottom of the pitcher and a lot of others in the tin's bottom. Fill half the tin-can with coconut fibre, rope or dry grass. This is a must to check the passage of dirt, soap, oil solid particles. Now fix this can in the neck of the pitcher in such a way that only 3 inches of the can is inside the pitcher. This eases the process of removing the can for periodic clean-ups.

(9) Place the cleaning pitcher just below the drainage pipe. Fix the pitcher properly by embedding most of it in the stone-bed and covering its sides with sand and gravel.

Fix an open; short (1½ ft) in pipe at the exit of the drainage-hole, in such a manner that the dirty water trickles down directly into the cleansing pitcher,

Note-(1) Clean the can once in a fortnight and replace the old grass and coconut fibre with fresh once.

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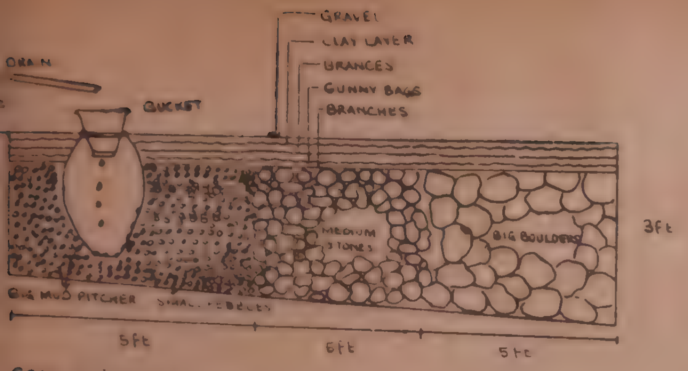
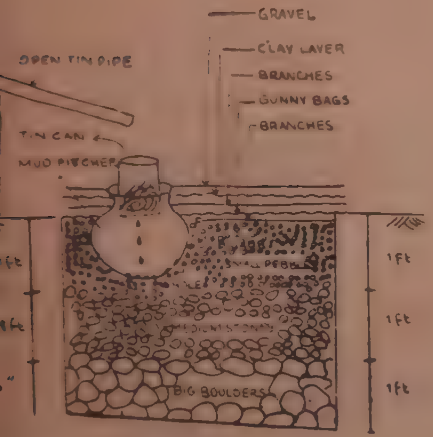
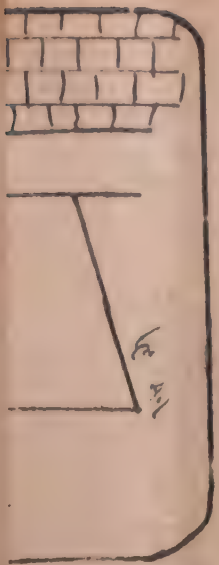
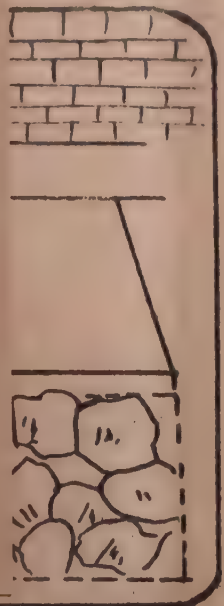

DRAIN
BUCKET
GRAVEL
CLAY LAYER
BRANCES
GUNNY BAGS
BRANCHES
MEDIUM STONES
BIG BOULDERS
BIG MUD PITCHER
SMALL PEBBLES
3ft
5ft
6ft
5ft

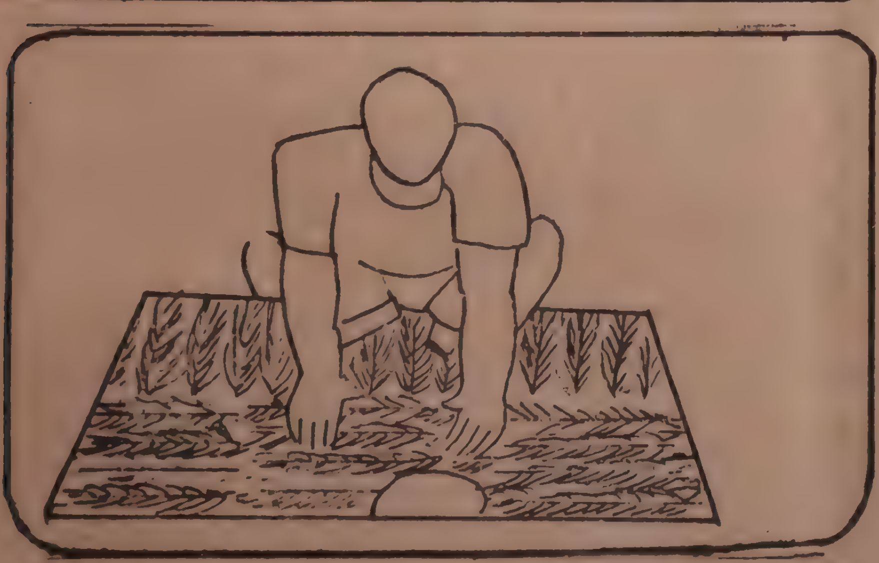
SOAK-PIT FOR A WELL

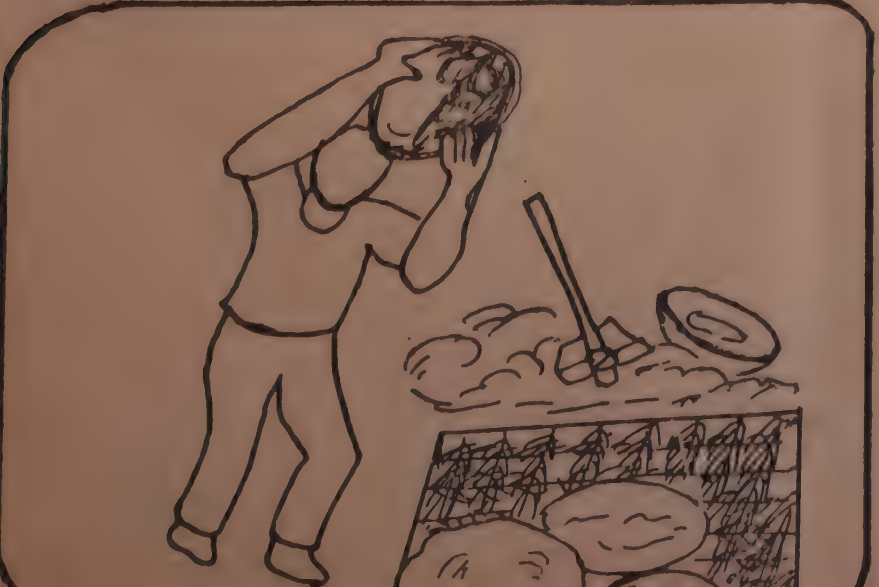

GRAVEL
CLAY LAYER
BRANCHES
GUNNY BAGS
BRANCHES
OPEN TIN PIPE
TIN CAN
MUD PITCHER
SMALL PEBBLES
MEDIUM STONES
BIG BOULDERS
1ft
1ft
1ft

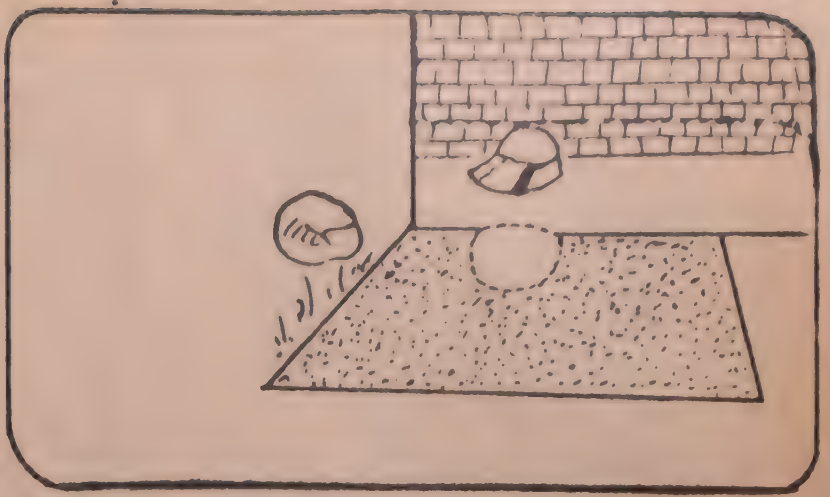
OUSEHOLD SOAK-PIT

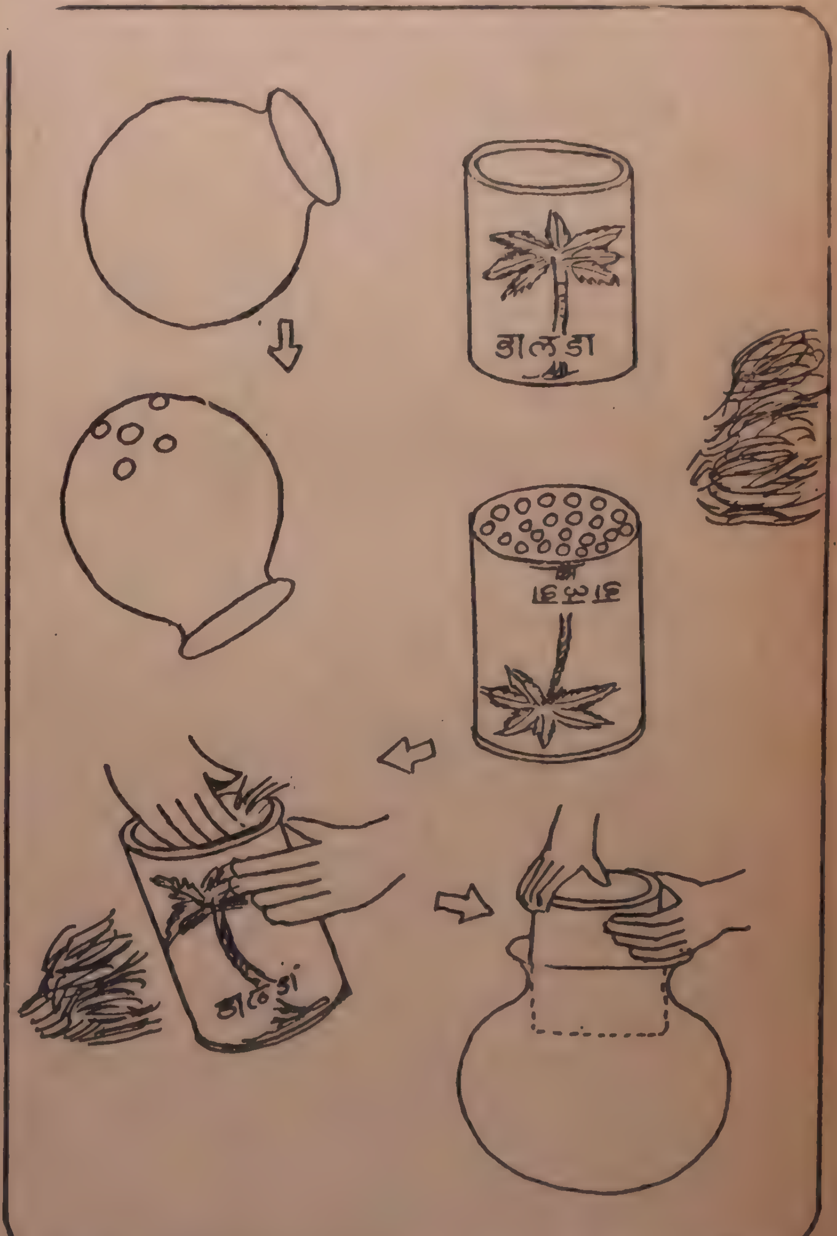


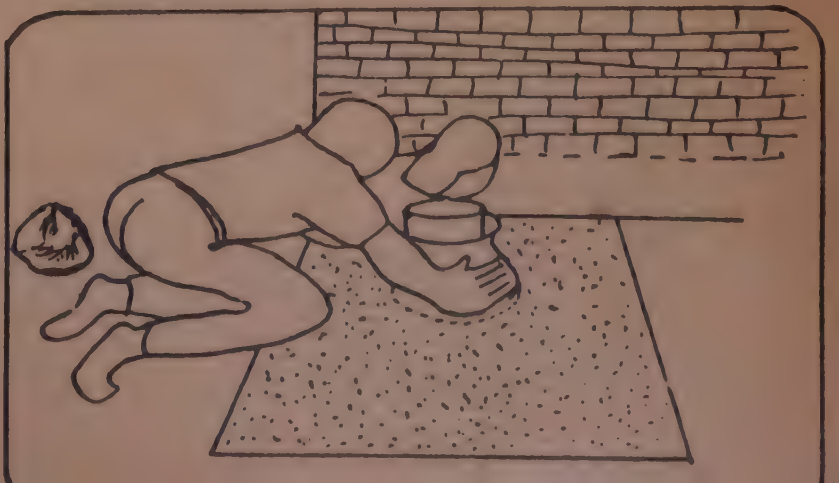












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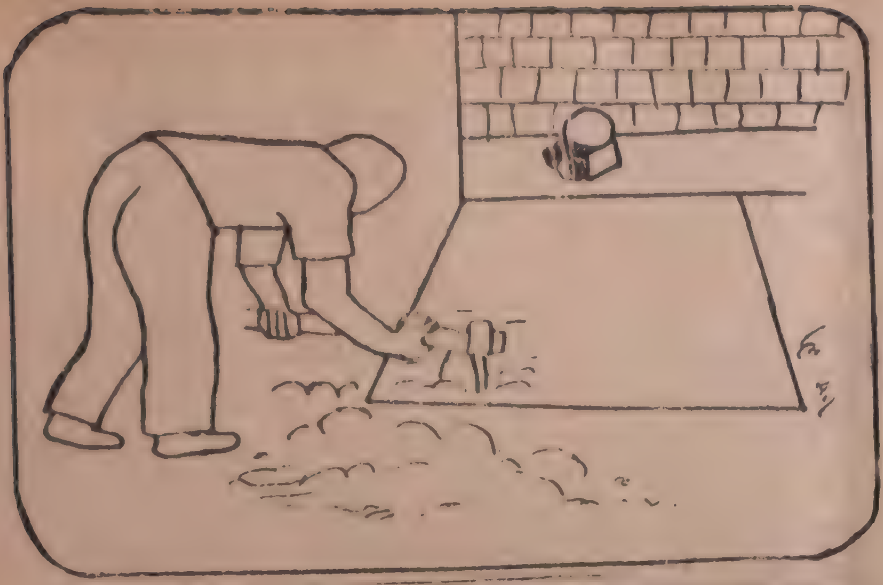

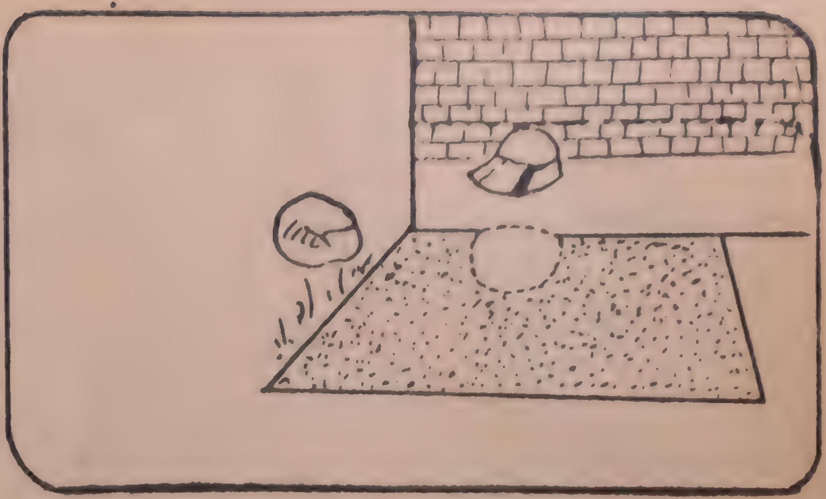

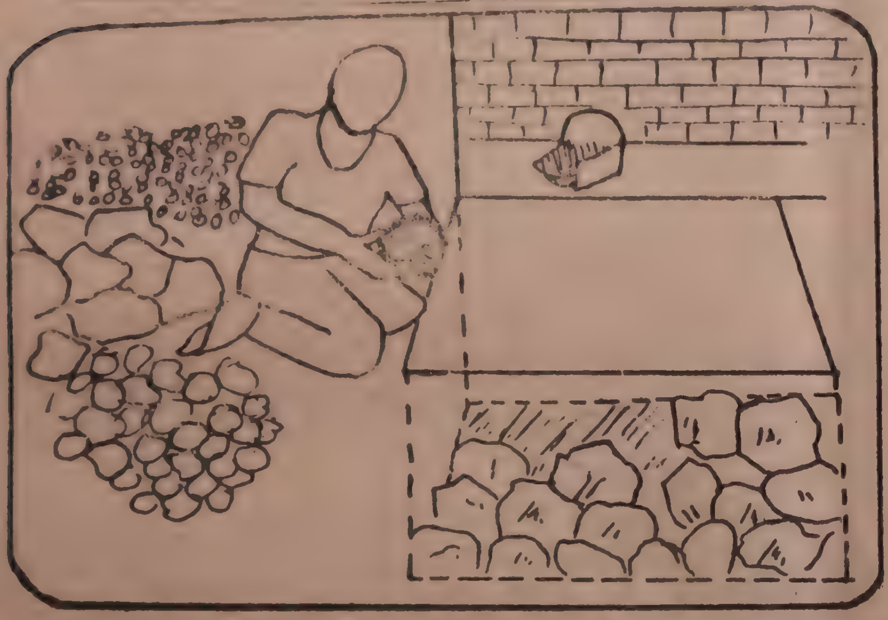

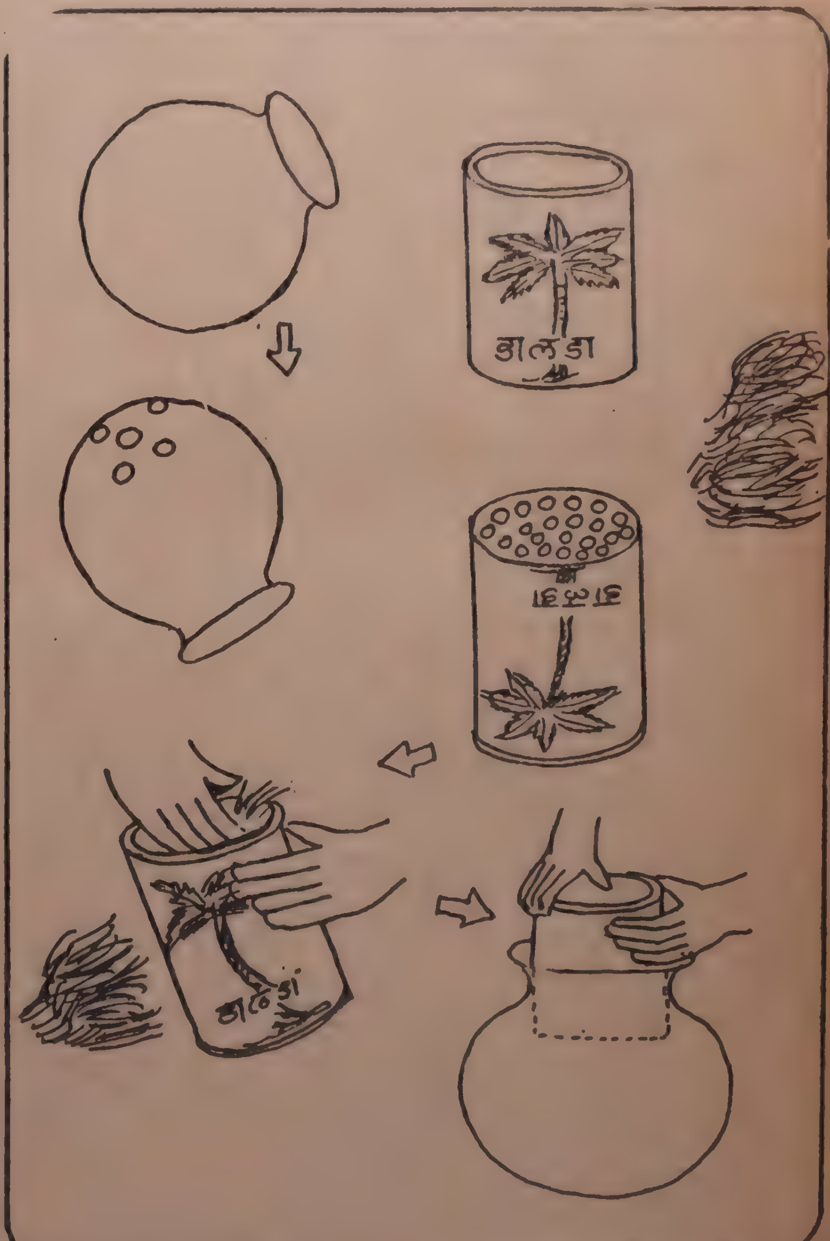
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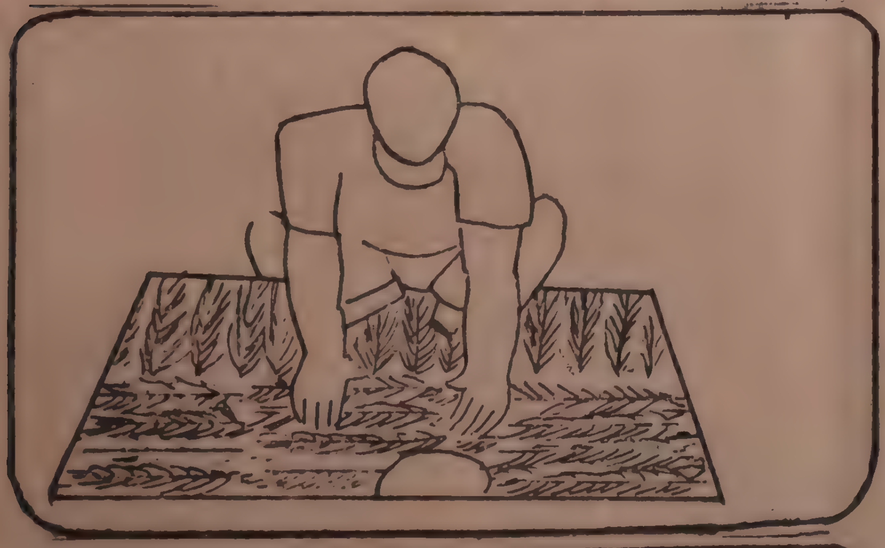
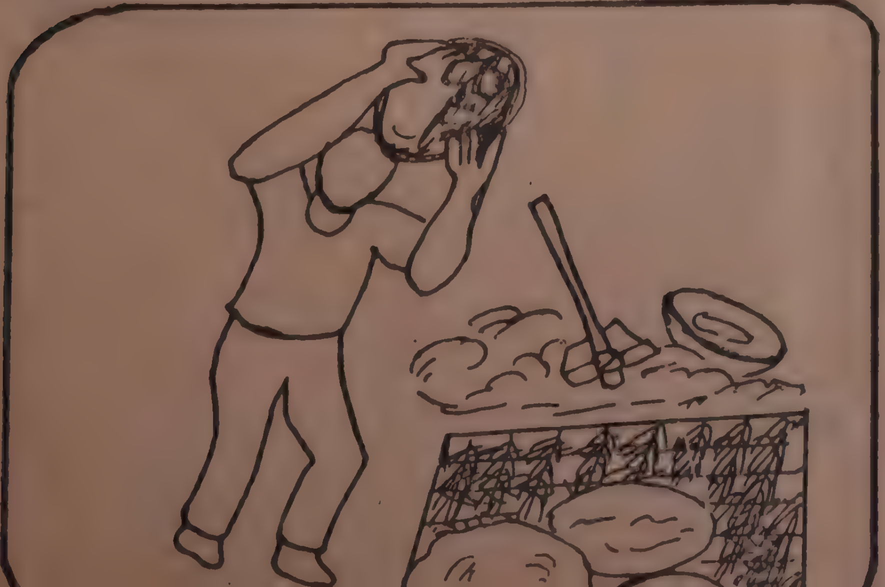
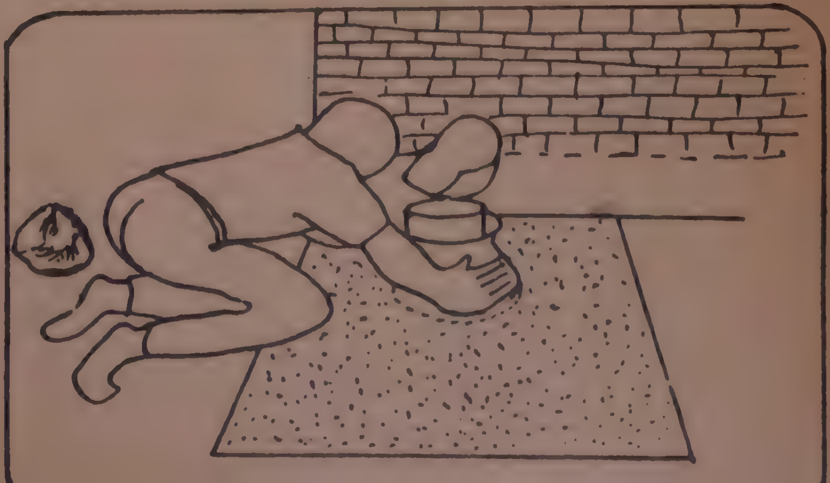




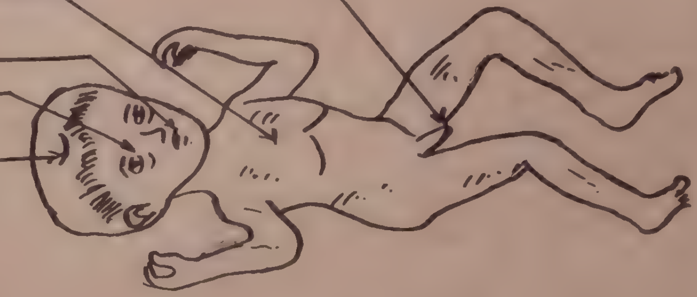


ORAL REHYDRATION

It is important that everyone - especially mothers - know the signs of dehydration and how to prevent and treat it.

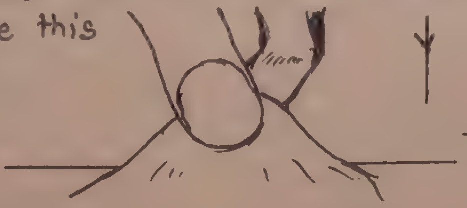
Signs of dehydration :

1. • Little or no urine; the urine is dark yellow
4 Suddne weight loss.
2. dry mouth
3. Sunken, tearless eyes
5. Sagging in of the 'soft spot' in infants

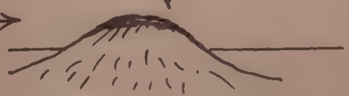


Loss of elasticity or stretchiness of the skin

Lift the skin between two fingers, like this



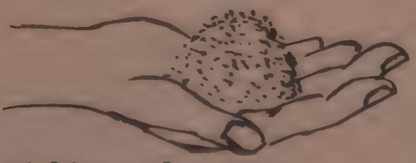
if the skin fold does not fall right back to normal, the child is dehydrated.



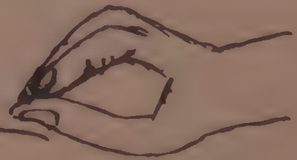
Very severe dehydration may cause rapid, weak pulse fast, deep breathing, fever, or fits.

- **Rehydration Drink.** In 1 Liter of boiled water put 2 level tablespoons of sugar or honey (Honey is better and ¼ teaspoon salt and ¼ teaspoon bicarbonate of soda. if you do not have soda, use another ¼ teaspoon salt. If available, add half a cup of orange juice or a little lemon juice to the Drink

A mother can also make the Rehydration Drink like this. She takes



a4 finger scoop of sugar or jaggery.



and a 3 finger pinch of salt.

and add it to 1 litre of boiled and cooled water.

Source: The voluntary Health Association of India. NEW DELHI.

DYHYDRATION

Dehydration :

Dehydration results when the body loses more liquid than it takes in. This can happen with severe diarrhoea, especially when there is vomiting as well It can also happen in very serious illness, when a person is too sick to take much food or liquid.

People of any age can become dehydrated, but dehydration develops more quickly and is most dangerous in small children

A baby needs water to drink, especially in hot weather. Often a mother does not give water to her baby till he is six months old. A baby cannot tell his mother he is thirsty, but needs water several times a day The mother should take water from a clean source and keep it in a covered pot. If possible, she should boil the water for her baby. Especially when the baby has diarrhcea or vomitting, he losses a lot of water from his body. He needs extra water many times a day.

The prevention of diarrhoea depends both on good nutrition and cleanliness. These include the use of latrines, the importance of clean water, and the protection of food from dirt and flies.

***Breast feed rather than bottle feed babies**-Breast feed babies for at least 2 years if possible. Breast milk helps babies resist the infections that cause diarrhoea. If it is not possible to breast feed a baby, feed him with a cup and spoon. *Do not use a baby bottle* because it is harder to keep clean and more likely to cause an infection.

*After 4 months start giving the baby new or solid foods. Start by giving him just a little, and mashing it well. Give clean fresh food cooked just before eating. He has to learn how to digest new foods, and if he starts with too much at one time, he may get diarrhoea. Give the child rice and dal water, juices, coconut water etc.

*Keep the baby clean and in a heat place. Try to keep him from putting dirty things in his mounth.

*Do not give babies unnecessary medicines.

*If there is no latrine, pass stool away from the house and the drinking water.

Prevention and Treatment of Dehedration :

*A dehydrated person should drink large amounts of liquids : water, tea, soup, etc. But do not wait for dehydration to begin,

*Dehydration can usually be prevented if a person with diarrhoea, with or without vomitting, is given plenty of liquids or Rehydrtion Drink from the very first. This is especially important for small children with watery stools.

*Especially useful in the prevention and treatment of dehydration is the Rehydration Drink.

Two methods are already illustrated in the opposite page. The following is one more effective method of making the Rehydration Drink.

Method III:

Boiled water-1 litre (4 cups)

Glucose powder-20 gm or 8 level teaspoons.

Ordinary salt (sodium chloride)-2 gm or ½ level teaspoon.

Baking soda (sodium bicarbonate)-2 gm or level teaspoon.

Potassium chloride-1.5 gm or 1/3 level teaspoon.

If you have glucose, but not potassium chloride, use only half the above amount of salt and bakings soda.

Give the dehydrated person sips of the rehydration drink every 5 minutes, day and night, until he begins to urinate normally. A large person needs 3 or more litre a day. A small child needs at least 1 litre a day.

Keep giving rehydration drink often in small sips, even if the person is vomiting. If the dehydrated person cannot drink enough to correct the dehydration or if he vomits all he drinks, find a health worker who can give liquid through the veins (intravenous solution). Note : When possible, make Rehydration Drink using bee's honey or jaggery rather than sugar Honey consists partly of a simple sugar (glucose) that the body can use more easily. Even better than honey is glucose power. Making Rehydration Drink with glucose or honey is especially important if the child is very malnourished or has severe diarrhoea.

* * *

Energy-A Feminist Issue

(Continued from page No 12)

While men from the poorer families assist in firewood gathering, and do most of the tree felling, they centribute very little energy to fetching water or to the processing and cooking of food. World-wide, these functions are considered a part of the woman's sphere, and are less variable across income lines than fuel collection How these two arduous activities, water fetching and food preparation and cooking, can be made less human energy-intensive at the village level is a major challenge to those interested in alleviating poverty among the world's poorest.

(Irene Tinker, Equity Policy Centre, 1525 Eighteenth Street, N. W. Washington D C 20036)

Experimental Studies on Firewood Cookstoves

The domestic energy consumption pattern studies done by us in 1978 have shown that 90% of the households in rural areas, 75% of the households in semi-urban areas and 25% of the households in the urban areas use firewood stoves. In rural areas the only buyable fuel is firewood, because it is cheaper as compared to the only other available commercial fuel viz. kerosene oil used as a power source for lighting. In suburbs the cost of transportation and its logists makes the commercial fuels costly and at times scarce. In urban areas, firewood is used only where LPG and kerosene are not available. These considerations led us to work on improving the efficiencies of the chullahs.

Chullahs in Use :

The most common types of chullahs used in and around Pondicherry are one holed and two holed pottery chullahs made by the local potters and sold in market. These are buried in the ground with a clay platform surrounding it. In a few villages which are economically weaker, the villagers build their own chullahs out of old water pots. Since, most of the roofs of the houses are thatched or tiled, the smoke coming out of the chullah protects the bamboo rafters and purlins from insects and is not considered so much of a nuisance. Also the fire risks and rain leakage associated with a badly installed chimney as well as its cost guided us to work on non-chimney chullahs to begin with.

Cooking Habits:

In rural areas, most of the women in the poorer section work in the fields. Those, who do not go for work, have to wait for their husbands' salary to come in the evening to buy things for cooking. Hence, they cook only in the evenings. For the morning and afternoon they keep the previous day's food or buy from outside, if they can afford. Normally cooking is done for 2 to 3 hours a day. Clay as well as aluminium vessels are used for cooking. To cook certain type of food stuffs, the lid has to be kept open for there is a possibility of boiling and spilling out.

In two holed chullahs the pot, in which more amount of food has to be cooked is kept on the first hole and the other with lesser ingredients, is kept on the second hole. Rice is the staple diet of all independent of their economic status. Ragi porridge is the morning food for the poorer in the ragi season.

Since the villagers particularly don't like the others interferring with their cooking practices, the modifications made are so very little from the conventional chullah that they are hardly visible as can be seen in Figure I. The mounts in hole 1 have been knocked off to give a smooth surface so that the mounts in the second hole provide a chimney effect to have a good draft inside the chullah.

Ideally, second hole should be higher but in actual construction by the local potter, we have not been able to assure this uniformity.

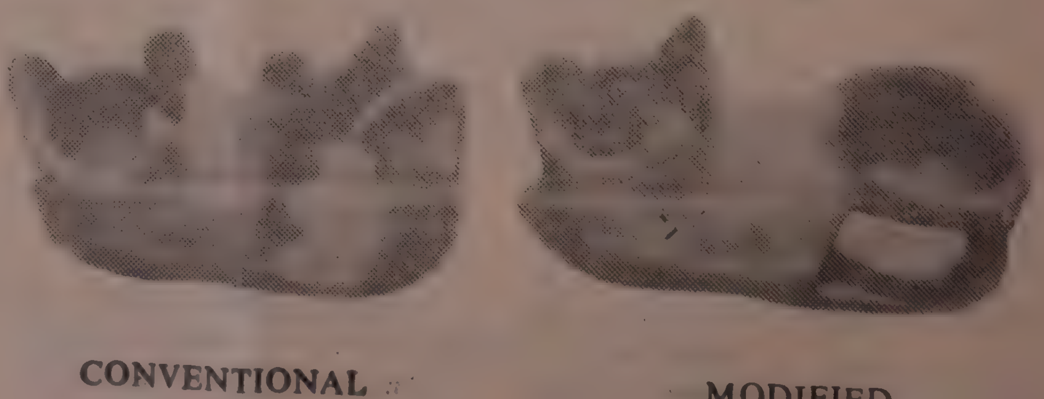
Test Procedure :

Boiling known quantity of water using known amount of fuel. noting the time taken for the water in each of the pot to boil, efficiencies have been calculated both taking vaporization of water into account as well as neglecting it. Water evaporation can be reduced to a negliable amount by using tight fitting lids, which decrease the cooking time and thereby saves fuel.

$$n2 = \frac{\text{Pots} \quad W_{wi} \cdot C_{pw} \cdot (T_b - T_i)}{Cv_{fw} \cdot W_{fw} + Cv_k \cdot W_k - Cv_{ch} \cdot W_{ch}} \times 100$$

$$n2 = \frac{\text{Pots} \quad W_{wi} \cdot C_{pw} \cdot (T_b - T_i) + L_H \cdot W_{we}}{Cv_{fw} \cdot W_{fw} + Cv_k \cdot W_k - Cv_{ch} \cdot W_{ch}} \times 100$$

Fig. 1 : Pottery Cook-Stoves



CONVENTIONAL

MODIFIED

where

n_1 = Net efficiency

n_2 = Overall efficiency

W_{wi} = Weight of water taken initially

C_{pw} = Specific heat of water i.e 1 kcal /kg

T_i = Initial temperature of water

T_b = Boiling temperature of water

L_H = Latent heat of vaporization of water i.e 540 kcal/kg

W_{we} = Weight of water evaporated

Cv_{fw} = Colorific value of fuel wood corrected for moisture

W_{fw} = Weight of fuel wood used

Cv_k = Calorific value of kindling material

W_k = Weight of kindling material used

Cv_{ch} = Calorific value of charcoal

W_{ch} = Weight of charcoal formed.

The laboratory test results have been presented in Table I. Heat balance between pot walls, stove walls, heat lost by the flue, excess air, moisture in the wood, incomplete combustion have also been studied. We have found that chullahs, pots, cooking practice and ingredients as well as the fuel used form a highly integrated and complex thermal system.

Field Test Studies :

Eight households from four villages, normally using fuel wood for cooking but different range of incomes and domestic energy mix, were provided with modified two holed cookstoves. Controlled tests were done by supplying 20 kg of Casuarina firewood to them, once for being used in the new stove and once in their traditional stove. Noting down the number of days for fuel consumption in both, results showed saving of one day's fuel for every three days if both had two cooking holes.

104 stoves were distributed in eight villages Users had a fair distribution of income levels so as to reflect different fuels used, cooking habits, types and items of food and family sizes. The survey revealed a few interesting facts :

*Economically weaker section used all agricultural wastes like tapioca roots, sugar-cane wastes, dried plants etc.

*Low income group used mixed fuels (mostly wood logs of casuarina and cashew) and all agricultural wastes.

*Middle income group used casuarina fuelwood logs.

Fuel savings of 28, 38 and 30 percent are reported from groups using agricultural wastes, mixed fuels and fuelwood.

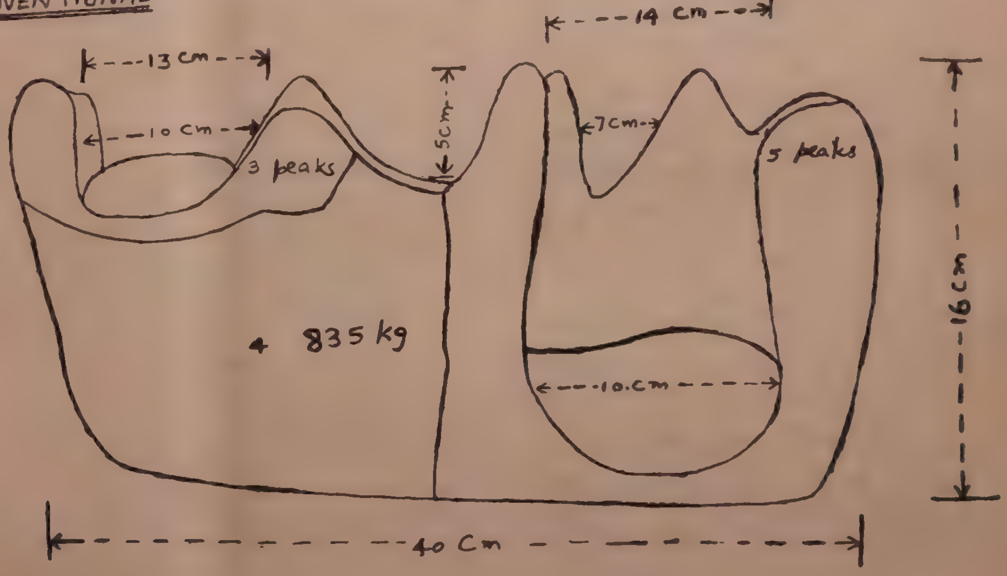
Households reporting satisfactory performance in terms of fuel saving and cooking time were in majority and constituted nearly 70 percent (52 out of 75). Six households had broken stoves and twentynine could not be contacted or did not respond.

Conclusions :

1. The modified chullahs have shown generally an improvement of 25% and 17% in the net efficiency in the lab tests as compared to the conventional chullah for clay and aluminium vessels, when used with lids on The pot chullah is found equally more efficient than the one holed pottery chullah in actual cooking test in the field whereas two-holed modified chullah is only 14% better in the field.

(Cont on Page 20)

CONVENTIONAL



IMPROVED

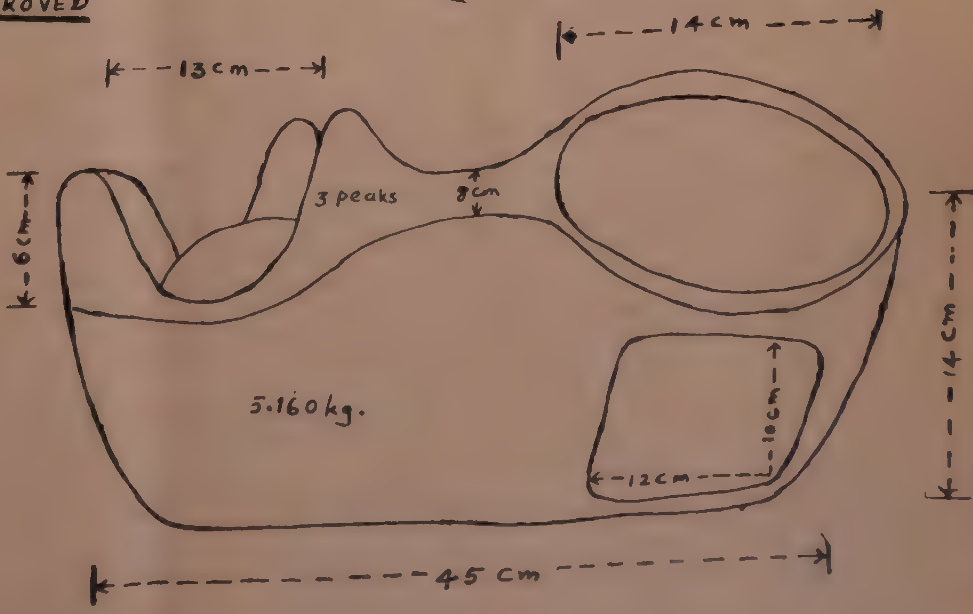


Fig. I - CLAY FIRED COOKSTOVES [TERI PONDICHERRY INDIA]

(Continued from Page No. 19)

Experimental Studies in Firewood Cook Stoves

2. Efficiency can be increased by thickening the stove walls or by building clay platforms surrounding the chullah and easiest of all by using lids on pots.

3. Even though aluminium vessels show higher efficiency than clay pots, we do not advice them to substitute clay pot because aluminium is highly energy intensive metal also there are some prejudices about their use.

4. Field users' survey revealed an asbolute score of 70% and fuel savings of 28% to 38% depending upon the fuel mix.

5. Field acceptability should be treated as the decisive criterion for choice of improvement strategy. In matters of cooking, a multistage optimization has better chances rather than a technical optimum

(For further information Contact : Shri C. L. Gupta and Usha K. Rao. Tata Energy Research Institute, Field Research Unit, Shri Auribindo Asram, Ponbicharry – 605 002.)

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7. Printer's name	Devendra Kumar
Nationality	Indian
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Sd /– Devendra Kumar

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WATCH OUT BIKER

The bicycles plying on the Indian roads are eight times the motorized traffic of any size or shape. Delhi alone has one million bikes against half million motorized vehicles. Yet, every fifth person dying on Delhi roads, yearly, is no other than the individual who pedals this two wheeler owned by every fourth household of the subcontinent. It is a shame that the apathy towards this "third-class citizen" stops the government to either evolve a national policy or plan safe roads for this most vulnerable commuter.

Out of the 20,000 road deaths. 4600 or 23 percent are cyclists The number of cyclists who died in 1980 amounts to 137, playing second fiddle only to pedestrians (246) in this 'death-game'. This sheer negligence of planners about bike riders combined with the reckless driving of trucks and buses apart from "cancerous" roads has turned the life of a cyclists into hell.

Seventy-five percent of the road deaths are due to negligent driving by city buses and trucks, according to the data collected by Central Road Research Institute of Delhi. "Sixty percent of such killings occur in Delhi and Bangalore, followed by 58 percent in Ahmedabad and 43 percent in Bombay", reveals the survey.

Directing cyclists on secondary streets just before a crossing is another solution sought by the Dutch as most of the accidents take place at these junctions. A distinct traffic light for cyclists which gives them enough time to 'escape' automobiles is another successful venture of the Dutch.

Delhi too has little bit-bits of cycle paths but few cyclists use these show-pieces, except in the morning rush hours. In Delhi-as in Holland-segregation of cyclists is vital for reasons of safety. Twenty per cent of the commuters who die every year in road accidents in Delhi are bikers. Even in Connaught Place–the heart of Delhi the bike-rider has to pedal along with the rest of the heavy traffic, though some crossings do have separate lights for him. Even at these freak crossings, it is not rare to see the last cyclist being swallowed up by the onrush of motorised vehicles as the light changes.

Vietnam, it seems, has a law which declares that large should yield to small. Hope this dream of Schumaker is at least realized by the developing countries, like India, which are yet to be bitten by the 'speed bug'.

The death rate of people dying at night is far more than those killed during the day according to the data given by Road Research Institute, New Delhi. Items like head lamps and back reflectors become a must even in our country where half the poputation is below the poverty line. Head lamps are always stolen and the reflectors either pinched off or broken in some minor accident. The remaining reflectors (if any) do not reflect properly and are risky at nights. The manufacturers have yet to device a padlock to prevent these thefts. Same goes for the cycle bell which is unable to raise her voice above the din of buses and cars.

Headlamp is a costly affair for an urban poor as a dynamo costs Rs. 70 and dry cells about ten rupees. Even the cheap kerosene lamp amounting to just two rupees is a big bother since it requires constant cleaning up combined with long wait at mile-long ration ques for a vee drop of oil.

Floureseent paints, apart from head-lamps and back-reflectors, can make the bicycle noticeable during nights, though they are expensive. Flourescent tapes are more durable as they run for four years and are also cheaper.

Since three-fourth of the cyclists are killed by the heavy traffic it is a must for this vulnerable commuter to look as conspicuous as possible.

"Lemon-yellow and bright orange are the two colours which are instant eye-catchers", explains Prof. Dinesh Mohan of Delhi III researching on road safety devices". "Orange sweet-shirts of polythene", suggests Dr. Dinesh Mohan", costing just ten paisa can be easily manufactured and sold compulsorily to cyclists to wear at nights (over their vests as it is a sweaty affair) to prevent collision with drunken truck-drivers

"Safety on the roads", retorts Don Mathew in his books "the bike is back", "is a matter of political will and hard cash". "There is no reason," continues Don, "why cycling should not be safe as any other mode of transport." Holland has already adopted this overall objective as its national policy which has resulted in ten out of 14 million Dutch cyclists pedalling this funny-looking two-wheeler to work, shop and fun.

— **Rajiv Gupta**

◆◆◆

A BINDING FACTOR -

Pozzolans and Pozzolan Cements :

Chemical reactions which lead to the formation of calcium silicate hydrates are the basis of cementious properties in water-resisting mortars and concretes used for construction purposes. Mortars and concretes in ancient Greace and Rome were made by mixing lime and volcanic ash which served as a source of reactive silica. Named after the town of Pozzuoli near Mt Vesuvius, such reactive silica materials are called pozzolanas or pozzolans.

Accroding to the American Society of Testing and materials, pozzolans are defined as siliceous, or siliceous and aluminous, materials which in themselves possess little or no cementitious value but will, in finely divided form and in presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

Many natural and industrial materials possess pozzolanic propelrties such as volcanic ash, diatomaceous earth, calcined clay and fly ash (produced by the combustion of pulvrize coal) . In general, the rate at which a pozzolan can react with calcium hydroxide at ordinary temperature is dependent on silica content, crystallinity of silica, and surface area of the material. Amorphous or non-crystalline silica is most reactive, whereas crystalline forms of sillca show only a little reactivity to lime. Generally, the lime, pozzolan cements contain 20 to 30 per cent lime by weight.

Modern pozzolan cement is generally made by blending Portland cement with a pozzolan. When compared to lime-pozzolan mixtures, portland-pozzolan mixtures develop higher strengths, and at a much faster rate even when the pozzolanic material is of low reactivity. However, these properties are not essential for small-scale building, and since Portland cement is expensive and generally unavailable to the rural poor whereas lime may be less expensive and relatively easily made from local limestone, it may be assumed that lime–pozzolan cements can be a feasible alternative in many areas of developing countries. In this context, it is important to note that if satisfactory and consistent setting and hardening properties are desired, the use of a pozzolan with high pozzolanic activity is more important in the case of lime–pozzolan cement than in Portland–pozzolan cement since lime itself is not cementitious.

Rice husks contain about 40 per cent cellulose, 30 per cent lignin, and 25 to 30 per cent hydrated silica which is present in non-crystalline form. Although cellulose and lignin can be separated from the silica by chemical extaction, combustion is a more economical method. The method of burning is key to the production of rice husk ash (RHA) with high pozzolanic activity. Another consideration is the importance of recovering energy as a by-product of the process, since 3,500 cal/g heat energy is released on combustion of rice husks.

Although the idea of recovering heat energy and making cement from rice husks has great potential for the developing countries, none of the available technologies appears to meet the requirements of the most needy in these countries. These people have nothing to invest, so how can they buy ball mills for grinding cement, or pay for the manufactured product to improve their housing conditions ? Another consideration is the time spent in rural areas gatharing firewood for domestic cooking.

Ideally, the RHA cement technology appropriate to the needs of the pepople in developing countries should not only be inexpensive but people-oriented. It should be able to provide pozzolanic ash for making cements.

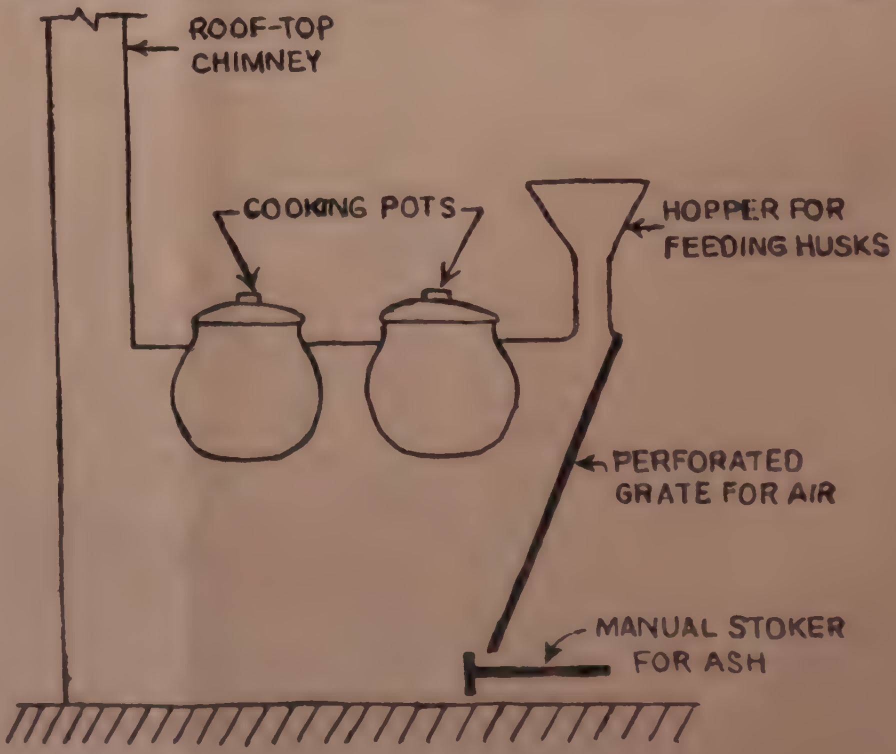

Fig. I Bhatti-type Indoor rice-husk cooker.

POZZOLANA CEMENT

of consistent and high quality, at the same time satisfying people's needs for a readily availadle source of domestic fuel With this object in mind, first at Berkeley and later at the Center for Application of Science and Technology to Rural Areas (ASTRA), Indian Institute of Science, Bangalore, the author developed an inexpensive cooker which uses rice husks as fuel and produces a non-crystalline silica ash. This cooker, described below, is somewhat similar in operation to the Indian tandoor.

Design and Operation of the Tandoor Type Rice Husk Cooker :

The cooker consists essentially of two parts, namely a ring and a removable lid with a spout in the middle, which serves as a vent for smoke The parts can be easily made from fired-clay by a village potter; or a mason can fabricate them from ferrocement. From the standpoint of safe thermal load (to keep silica in the amorphous state) the maximum diameter of the ring was fixed at 15 in, and the height at 6 in. Adequate insulation against heat loss can be provided if the wall thickness is half an inch or more The ring and cover assembly is placed on a 3 mm wire mesh screen which rests on top of two bricks. As rice husks produce a dense smoke during evolution of the volatile matter, the cooker is best suited for outdoor operation

Rice husks are difficult to ignite Once ignited, they burn in two stages. In the first stage, the volatile matter is removed in the form of bluish dense smoke. The brownish residue left behind is called char, which contains unburnt carbon from cellulose. The heat for cooking food is derived from the combustion of char to ash.

In order to start ignition of the husks, dry leaves and grass are piled under the wire mesh and are lighted after the ring (without the lid) is loaded with husk to depth of about 1″ only. When the colour turns from yellow to brown, more husks are added and the process is repeated until the ring is full of char; about 2 kg of husks are needed for this Meanwhile, when the charring process is underway, about ½ litre of rice is soaked in 1 litre water in a 7″ diameter earthenware pot, and ¼ litre of lentils or beans are soaked in a similar quantity of water in another pot. The two-pot assembly is inserted in the middle of the ring as soon as it is full of char. The ring is then covered with the lid; cooking time is about two hours. The quantity of food is adequate for a family of three to four persons. The food in the cooker can keep warm for several hours after the char has fully burnt. A local potter in the Bangalore area sold the fired clay pot and lid assembly for Rs 5·00, and earthenware cooking pots for Rs. 2·50; thus the entire cooking system including the wire-mesh costs about Rs. 10·00

Due to low heat-mass and small bedthickness, the measured temperature in the cooker did not exceed 600°C. Each 2 kg batch of husks produced about 400 gm ash which contained 2 to 4 per cent carbon, the rest being essentially silica. The absence of large diffraction peaks in the tandoor ash confirms that silica therein was essentially noncrystalline. The ash was soft and could be ground easily into high surface-area product using a pestle and mortar or a hand-operated stone-grinder.

Assuming two cooker operations a day, a month's ash will amount to 24 kg which, on blending with 6 kg of freshly slaked lime, would produce a bagful of high-quality of cement for one household.

The technology demonstrates an idea which can provide the basis for making poor communities self-reliant in cement. For the best results, village co-operatives should be formed to collect the pozzolanic ash in one place and provide cement to each member in turn. Co-oparatives would have the added advantage of setting up a quality control laboratory, and centralized grinding of lime-ash mixtures with an edge-runner or other types of equipment which may be less expensive in capital and operating costs than ball mills.

(Appropriate Techonology)

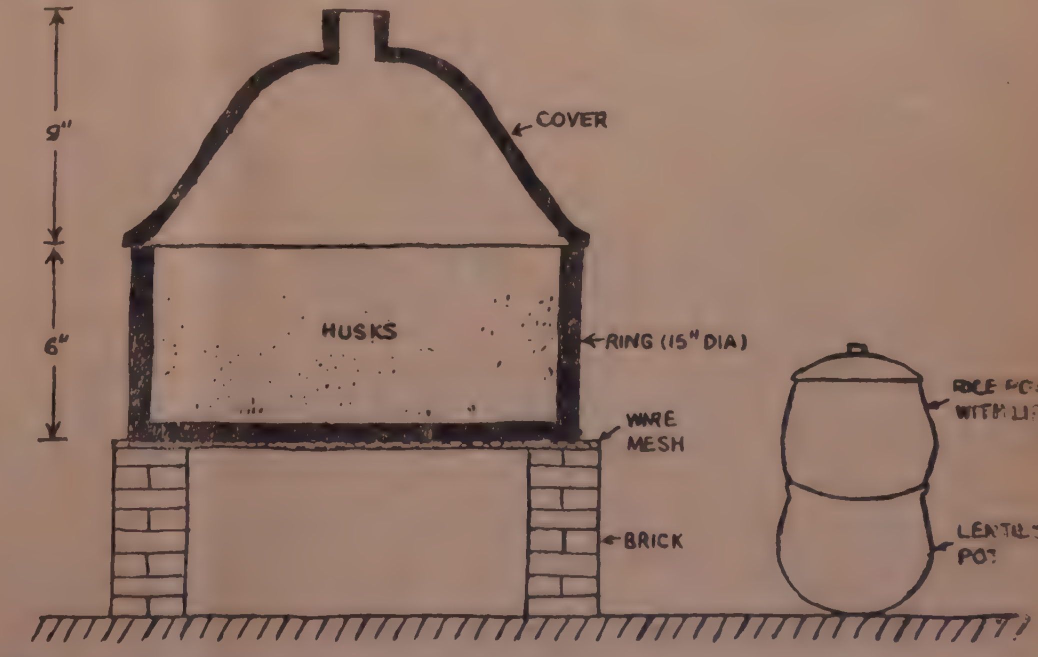

Fig. 2 Tandoor-type outdoor rice-husk cooker.

SOIL STABILISATION

To make mud wall construction strong and durable, extensive research has been undertaken in the field of soil stabilization as well. Many premier research organisations such as the central Building Research Institute (CBRI) Roorkee and Central Road Research Institute (CRRI), New Delhi have evolved techniques of soil stabilization using materials such as lime, cement, bituman, depending upon the characteristics of different soils. Soil stabilization eliminates the drawbacks inherent in mud houses which include poor natural stability of the soil resulting in its reduced durability. frequent repair or complete re-erection of wall, roofs etc. after each spell of rain.

Traditionally, certain amount of resistance to erosion of soil has generally been achieved through the local practices of the use of such additives as cow dung in the villages, the increase in the life of construction thereby has not been sustained. In order to achieve a reasonable life of mud constructions economically, attempts have been made in the last three decades by the application of the principles of stabilization to the soil intended for use in housing construction. The common stabilizing agents generally used for stabilization of soil include cement, lime and emulsified bitumen. Nearly any soil can be made into a better building material with the addition of correct stabilizer. Briefly, stabilizers perform the following action:

(i) They cement the particles of soil together so that the mud walls are built stronger and durable.

(ii) They increase resistance to weathering from sun and wind.

(iii) They render the mud wall water-tight thus protecting the same from rain water and erosion.

(iv) They protect soil from shrinkage and swelling.

Based on the scientific analysis, it is inferred that all types of soil are not equally suitable for stabilization. Before deciding the correct types of stabilizer to be added with the soil, a thorough testing of soil is done to determine the various physical properties of the soil. The best type of soil for stabilization with cement is the one which has a proper grading of particles of different sizes from the sand range to fine clay.

Method of soil stabilization with lime is suitable for highly clayey soil particularly black cotton soil. The Bituminous stabilization is more suitable for sandy soils. Clayey soil after suitable treatment with lime can be also stabilized with bitumen. Sometimes soil has a little too much clay in it for cement to do a good job for stabilizing. In that situation, a combination of lime and cement are to be used as stabilizers. Highly plastic soils and those containing organic matter are not suitable for soil stabilization.

The following percentages of additives are found most suited for manufacture of stabilized bricks blocks to achieve the desired strength, resistance to weathering and to effect economy

(i) Cement upto 5 percent (by weight of soil)

(ii) Lime upto 3 per cent (by weight of soil)

(iii) Cement 1·5 per cent + Lime 1·5 percent (by weight of soil)

(iv) Emulsified bitumen – 1 percent (by weight of soil).

Stabilized bricks which are made manually as well as mechanically are used in the same way as conventional bricks. Hand operated and mechanically operated brick presses can produce 100 and 250 stabilized bricks per hour respectively. Usually, these are sun-dried and laid in ordinary mud mortar and are protected with covering of non-erodable mud plaster from the outside and with ordinary mud plaster from the inside However, when these are made using coal-tar/bitumen mortar they can dispense with plaster and have a thin rendering of lime-mud or lime-cement wash. The lime in combination with flyash (which is a fine residue obtained from thermal power stations using ground or powdered coal as boiler fuel) make a cement almost as good as Portland cement. This is used as stabilizers for stabilizing of both sand as well as clayey soils. Of all the stabilizers mentioned above, widest use has been made of cement. Soils which are treated with lime alone are slow in strength development as compared to cement.

(Rural Housing Jan. 1983)

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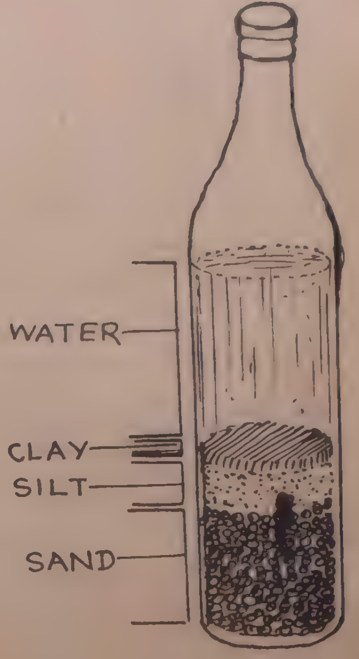
SOIL TESTING FOR STABILIZATION

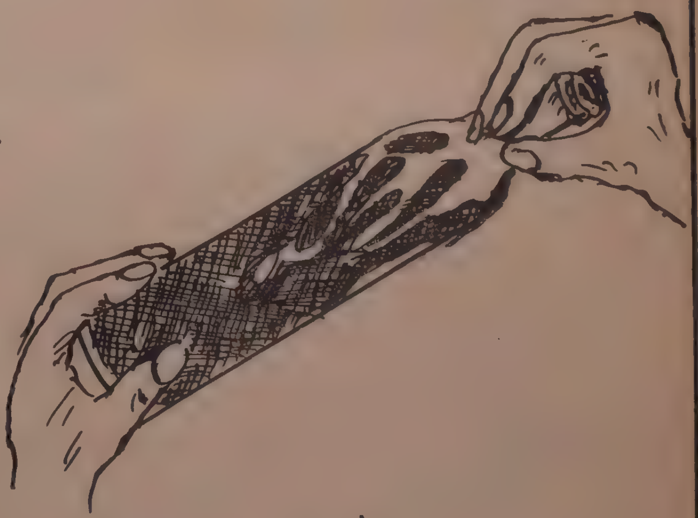
Sedimentation Test

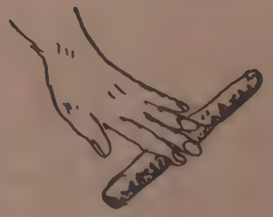
This test gives an impression of the composition of the soil.



Take a glass bottle.

- Fill the bottle up to one quarter of its height with soil
- Add clean water up to the top of the bottle
- Close the bottle with your hand and shake it well until the water and the soil are thoroughly mixed.
- Put the bottle on a horizontal surface.
- After one hour, shake the bottle again well and put it again on a horizontal surface. Now the bottle must be kept without any shaking.
- After 45 minutes already you can measure the thickness of the different layers and compare it to the total height of the soil in the bottle (Without water) This gives you the percentage of the amount of clay, silt and sand in the soil.

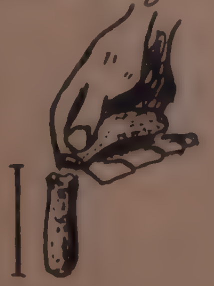




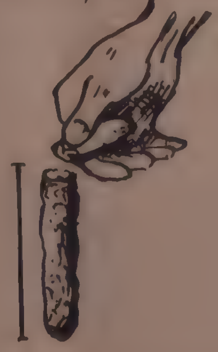
Roll a "soil cigar". Make it as long as possible.

Take it carefully into your hand. Let one end of it keep projecting out. If it breakes:

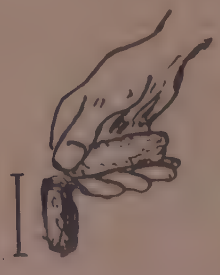
Between 5 and 15 cm. the soil is good for stabilizing



over 15 cm. the soil is too clayey. Add sand.



before 5 cm. the soil is too sandy. Add clay.



WINDOW TO THE WORLD

Mass Produced Film Types Solar Cells : Matsushita of Japn has found a way of printing solar cell material directly onto a glass base. This will cut the cost of solar cells by more than half, and increase their abiilty to convert light to electricity. The company says the process could sidestep some of the problems of conventional solar cells, such as, cost and low efficiency.

Cheper & more efficient : Conventional solar cells rely on silicon crystals and energy conversion is around 10 per cent. Capita cost is nearly £ 7 (Rs. 105) for every watt of electrical energy to be produced by solar radiation. The new technique developed by Matsushita relies on screen printing and brings the mass production cost per watt down to under £ 3 (Rs. 45). Energy conversion is 13 per cent.

A cadmium sulphide paste is printed through a screen onto a glass substrate. After drying and sintering at high temperature (690°C) in a nitrogen atmosphere, another layer of cadmium and tellurium is sintered on followed by a topping of carbon. Silver electrodes are then overlaid by another printing stage and the material sold in sheets up to 30 cm squre.

Matsushita says its new material can power road signs, radio relay stations. Irrigation pumps and out door clocks. It will also run domestic appliances in areas of Japan with no mains supply.

(The Hindu April 13)

MEXICAN PRODUCTS FROM AGROWASTES : The UNAM Institute of Materials Research has developed methods to convert agro and industraial wastes to useful products. One of the main programmes in this area has been the manufacture of construction materials from rice husk, bagasse and coconut wastes. The construction materials thus manufactured are said to be characteried by low densities. adeqate resistance, satisfactory thermal properties, low cost and wide availability. They are claimed to be excellent sound insulators.

These materials are ductile and absorb greater deformation energy which makes them suitable for seismically active areas. They are also more durable than concrate against acids and sulphates.

INDONESIAN BIOCOAL :

Bioriquettes can be made from dry biomass using a method developed at the Gadja Madah University Yogyakarta.

A 10 cm layer of biomass is put into an open container, used as a kiln, and fired. The kiln may be a drum, a flower pot, or simply a 55 × 55 × 55 cm hole in the ground lined with stones or bricks. The mouth of the kiln must be narrowed or closed by a metal sheet or board or plywood.

A thick column of smoke will emerge from the mouth of vessel, preventing air from entering the kiln. Biomass is added gradually into the kiln for about an hour and stirred with a metal or a green wooden rod. Biomass is allowed to burn exothermally to coal. When all biomass is burnt, the char is quenched with water and dried and then briquetted.

Papua New Guinea Coconut Dehusker : The Planters Association of Papua New Guinea, in collaboration with the University of New South Wales Research Development Company in Australia, produced a coconut dehusker which can process 1,000 coconuts per hour. A person doing the same job can dehusk a maximum of only 300 /each hour.

The dheusker works by feeding the coconuts on a conveyor belt into a system of contra-rotating rollers. The rollers have spiral flutes which tear the husk from the nut. The nuts are rejected from the machine and rolled between another set of rollers which perform a final cleaning operation.

Philippine Banana Products : A study made by Teresa Bayana of St. Louis College showed that a number of useful products can be derived from the trunk, leaves, peelings, flowers and roots of banana.

From the trunk, 13 products were derived : plastic, paper, ink, dye, fibre, jelly, candy, jam, pickles, animal-feeds, rope, vegetables and medicines (anti-diarrhoea, anti-septic dressing to inflamed and blistered surfaces; anti-baldness, cure for dysentery and cure for gonnorrhea) .

From the banana peelings, dye, ink, jelly, candy, jam, flour, oil, vinegar, acid-base indicator, soap, ethyl alcohol and wine.

From the leaves : dye, lye, cigar, gunpowder, activated carbon fertilizer, fuel, fibre, paper, medium for mushroom culture and medicine (blood coagulant) .

From the roots : medicine (anti-febrile and restorative, enema for diarrhoea, cure for diabetes).

Methods or processes used in producing the various products were pounding and bleaching, distillation, water extraction and evaporation, burning in the absence of air, soaking overnight and storing for several days.

(Asia-Pacific Technglogy Digest)

●●●

NEWS

Rural Women Face Lung Damage from "Chulas" : Rural house-wives using traditional stoves run a high risk of getting lung cancer or seriously damaging their lungs. They are each exposed to as much benzo (A) pyrene (BAP) in three hours as they would inhale if they smoked 20 packs of cigarettes a day. These observations were made in a study covering some villages of Gujarat's Kaira District. The study was conducted by the Resources Systems Institute of East West Centre, Hawaii, NIOH, Ahmedabad and the Jyoti Solar Energy Institute, Vallabh Vidyanagar.

(IE 18/3 P. 5)

Cheap Anti-diarrhoea Vaccine Developed : A recently developed anti-diarrhoea vaccine which costs costs no more than a match-box can help save the lives of millions of children every year, says a UNICEF report. The cure, developed by the UN agency, consists of specific mixture of distilled water, gluclose and salts to compensate for the loss of liquids caused by diarrhoea. The medicine does not involve any high cost intravenous injections of nutrients which, uptill now, have been used to cure the disease

(IE, 3/2 P. 10)

Hard Board from Cotton Waste : Scientists at the Cotton Technological Research Laboratory, Bombay, have developed a process for converting the huge waste of cotton stalks in the country into attractive hard boards

Steps to Improve Ayurved System : The Union Government is taking steps for the rapid development of Ayurved system and other Indian systems of medicine including homeopathy and it has provided a sum of Rs 29 crores in the Sixth Plan for this purpose.

(IE, 7/3, P 11)

Ban on Drug : Government has decided to ban from June 1983 the sale of fixed dose combination of Destrogen and Progestrone, a drug being used for pregnancy test.

World's first Wood-based Gasifiers Commissioned : For tht first time in the world, Indian and French Scientists at Jyoti Solar Research Institute in Vallabh Vidyanagar, Ahmedabad, have jointly produced mini-sized wood-based gasifiers to replace diesel fuel for feeding two kinds of engines (4·5 HP and 10·5 HP capacity each).

The gasifiers, which turn splinters of wood into fuel gas help in replacement of about 75 percent diesel fuel use in engines for running agricultural pumpsets. About 3·5 kg of wood splinters (costing about 75 paise) would save one litre of diesel (costing about Rs. 3·65) A 10·5 HP diesel engine normally consumed about 2·4 litres of diesel every hour. In the engine is fixed with a wood-based gasifier, the diesel consumption declined to mere 0·58 litre per hour, resulting in a diesel replacement to the tune of 76 percent. The wood consumption by the 10·5 HP gasifier was about 8 to 10 kg. per hour.

(Economic Times, 21/3–P. 8)

Plant Extract Coating Prolongs the Life of Fruits : A simple unconventional technique for prolonging the shelf-life of fresh fruits like orange, mosambi and lime has been developed on a laboratory scale by CFTRI scientists.

The technique which eliminates the need of refrigerated storage consists of coating the fruits with a plant extract comprising essential oils and phenolics. The compounds are non-toxic, prevent microbial spoilage, and do not affect the natural gloss of the fruits.

CFTRI's preliminary experiments show that oranges coated with the plant extract can last upto 20 days longer at room temperature than their normal shelf-life of about 10 days. In case of mosambi, the normal shelf-life 12 days can be extended to 30 days. The life of limes can be extended from the normal 5 days to 12 days.

Further work is in progress to establish its efficacy on other fruits and vegetables.

C F T R I News letter
Nov.–Dec. 82

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Industrialism & Indulgence

(Contd. from Page 1)

tively harmful to the efficiency of the individual and yet they being habit forming, their consumption goes on increasing while necessities are to be optimised, luxuries are to be avoided, the vices are to be completely shunned and got rid of. Industrial growth for commercial interests goes on increasing the consumption of all categories of things and the margin of profit being more as one moves from the 1st to the 3rd category the latter have more attraction for the entrepreneurs. However it requires a constant pressure of advertisement to specially increase the clientele and quantitatively saturate the consumer market already existing.

Arms and Armaments: are the most destructive category of industrial production. The increase in this area both in quality and quantity has had a phenomenal increase. Probably one sixth of the human talents and resources of the world are being used to this end and the danger to the very existence of man getting to the critical stage due to the deadly pile of armaments. The pressures of industrial production with its spiralling increase generate pressures of military as well. It needs no explanation that the armament race must stop and for this the responsible factors include industrialism.

Gandhiji was of the view that the spectre of indulgence threatening man's existence through violence it generated by (a) destroying the limited resources, (b) making man's own growth perverted and (c) generating conflicts with increasing intensity. He radically changed his life style and preached for the use of industry for self-control rather than self indulgence. Gandhi's model for industries was for the fulfilment of the basic necessities and that their use for the other three categories should be sought to drastically reduce as we proceed from second to the fourth. The concept of taking least from nature and society and giving your most for the banefit of both was present in the culture of man. Culture is defined as the increasing concern for a wider circle of those, whom we regard as our concern. This concern becomes restricted as man's self centredness is heightened through consumerism

I remember the discussion I once had with famous orientologist academician late Sabajan Safaroi in Moscow, who was hosting us on the occasion of the Gandhi Centenary. He said that he was greatly influenced by a poem he read in his childhood from Firdausi's 'Shahnama' on 'Alexander Masidon and the Brahmin.' The great warriar was asked by his teacher that when he went to India he must meet a philosopher. Alexander in his wanderings came across a saintly person sitting in the winter morning sun under a banyan tree. He approached him and introducing himself through his interpreter asked him what was the secret of his serenity. The saint asked a counter question, saying how that you have travelled half the world have you got what you had desired ? Alexander said, 'The more countries I conquer, the desire for more increases'. The seer said 'I have no desires and that is the secret of my serenity'. Baba Gufurof said that this quality is still present in the Indian culture and Gandhi was a representative of this great tradition which we need to propogate to the whole world, if it has to survive or let the planets resources survive. He said one more thing and that was that on the basis of his frequent visits to India his faith that India still retains the values of regarding the saint higher than the king is strengthened. To me it looked that self-control has a greater value than self indulgence in our country and that we can still be able to show a way to the world.

Devendra Kumar

Printed and Published by Devendra Kumar on behalf of Science for Villages, Wardha, Editor : Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha-44201. Printed at Majestic Printing Press, Nagpur. Regd. No. WDA-119

SCIENCE FOR VILLAGES

lding a Bridge between the Science Lab and the Village Mudhu

71/72 Aug/Sept- 1983, Monthly Annual Subscription Rs. 15/- (10 Dollars) Individual and Institution- Rs. 25/- (15 Dollars).

Information Service
1983
R.I., MYSORE

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F-D-36

Ownership Pattern of Cowdung in The Village

Many a times a point has been raised that as the number of gas plants, for giving cooking gas run on cowdung are increasingly constructed, the poor in the village will be deprived of the cowdung they could earlier collect for using as the kitchen fuel. This is based on the premise that since it is the people having a large number of cattle who can afford to get such plants constructed and possess sufficient cowdung to feed them, the cowdung which was earlier not utilised by them and therefore available to the village poor for their meagre fuel will now be lost to the latter. This point has been reiterated in many statements of learned people who aver that this aspect of depriving the village poor of cowdung because of the introduction of a new technology in the villages should be taken care of. Though on the surface of it, the above view seems to be well founded but in actual practice what we find in the villages is something quite different and it is necessary that we take note of what the actual practice is in the villages in regard to the ownership of cowdung.

The practice in the villages in Maharashtra as well as in M. P. is as follows. The village cattle are, as a rule, entrusted to the cowherd who takes their charge in the morning after they have been milked and brought to the particular spot in the village where all the cattle gather. This is done around 7 or 8 in the morning. These cattle are looked after for grazing during the day till about four or five in the afternoon when the cattle herd returns to the village common from where the owners of the cattle have to take them back to their homes. In the night only, these cattle are tied and kept in the cattle shed of the owner. Thus whatever cowdung is dropped by the cattle in the owner's home is that of the owner. In the morning as soon as the cattle get out of the threshold of the house and come on the lanes of the village, whatever dropping they make becomes public property and village children vie with each other to collect these droppings as the cattle walk towards the ground where the cowherd takes charge of them. The ownership of the cowdung which is dropped in the village common where the village cattle gether is recognised as that of the Gram Panchayat (Village Council), which auctions it on an annual basis to the person who bids the highest. All cowdung that falls in this place- (a) in the morning before the cattle go out from there for grazing, (b) in the noon when they may return to the spot for rest and (c) in the evening- is taken care of by the villager who has taken the contract. There is a fourth area also. During the day whenever the cattle graze, they drop the dung and this dung is again anybody's property. It is usually these droppings which the village poor collect along with other twigs, shrubs and agro-wastes for their kitchen fuel. Thus there are four divisions in the ownership of the dung- (1) in the cowshed, (2) on the road, (iii) in the village common and (4) in the grazing grounds. In this only the 1st belongs to the cattle owner. Since this and similar practices prevail in the villages, the introduction of cowdung gas plants may not adversely affect the availability of the cowdung to the poor of the villages and they may continue to get the share of cowdung they were getting before.

May be there are areas of the country where the practice of sharing and ownership in the case of cattle droppings is different, but basically it seems that the above tradition holds good in most places. This however is an important issue that when the gas plants come up, the village poor are not deprived of the little cowdung which was available to them earlier. There is a parallel in the milk trade wherein at earlier times when whatever milk was produced in the village had no outlet and therefore the excess milk was got converted into butter and ghee there itself. At that time the butter-milk (what remained after taking out the butter) in excess to the need of the household, was given away to others who had no cattle and thus the poor did occasionally get this milk product free. With the milk industry being organised in the villages and all milk in excess being taken away to the city, the village poor are deprived of this little nutrition which they got earlier. Fortunately, as explained above, nothing of this type seems to take place in the case of cowdung gas plants. The anxiety that is being expressed in this regard therefore may not be so pertinent. —**Devendra Kumar**

from the labs

Fire Retardant Thatch Roofs Undergo Successful Short Term Tests

Manually pressed thatch panels using bamboo strips, bhind (a local reed) and non-erodable mud plaster developed by Central Building Research Institute (CBRI), Roorkee, subjected to fire tests on a short term basis have given encouraging performance. Panels of 2 m x 2 m size were prepared with non-erodable mud plaster on both sides as well as only on one side. The panels with non-erodable mud plaster on both sides were not effected by the fire, but the surfaces of the panels having plaster only on the top were charred without any spread of fire. The spread of fire was automatically stopped after the loose thatch projecting from the panels got burnt. The panels without plaster in the bottom withstood the test for 1½ hr without any collapse. The panels are now being laid for long term tests.

Utilization of Water Hyacinth In Treatment of Tannery Waste-Water

The wastewater discharges from tanning industry are among the most polluting of all the industrial wastes, and contain organic and inorganic pollutants in solution, suspension and colloidal dispersion. They have a pH of 7-8 with BOD (biological oxygen demand) ranging from 2000 to 2500 mg / litre with a chromium content of 150 to 200 mg/litre.

The central Leather Research Institute (CLRI) Madras has studied utilization of water hyacinth in the treatment and disposal of tannery wastewater. Water hyacinth was grown in tanks so as to cover 60-70% of the surface area with different concentration of tannery waste with a view to finding out at what dilution of tannery waste with sewage the growth of the plant would be normal with concomitant removal of BOD and chromium. The different concentrations of tannery waste in admixture with sewage used in these experiments were 20, 40, 60,80 and 100.

Water hyacinth thrived well initially in all the concentrations, but began to show signs of decay after about 10 days in the last three higher concentrations of tannery waste. Retarded growth and decay of plants were observed in all the concentrations after a period of four weeks. The BOD removals in 16 days in the five concentrations, in the order given above, were 80%, 68%, 49%, 35%, and 20% respectively. Chromium was completely removed in 20 and 40 concentrations within 8 and 16 days respectively and in other higher concentrations, the removal was 60 to 80%. The results show that water hyacinth can be utilized for treatment of tannery wastewater in admixture with sewage.

Leaf cup making machine

In india, cups, dishes and plates made from leaves are traditionally used for packaging items like butter, sweets, etc. and for serving food dishes at religious and social functions. These leaf cups and plates are produced by age old method of manual interpinning of wet leaves. Central Food Technological research Institute, Mysore developed a simple machine for manufacture of uniform leaf cups, dishes and plates. The articles produced by this machine are elegant, strong, hygienic and better in quality and appearance. These leaf cups and plates are produced in all sizes and shapes like hexagonal, round, square just by changing the upper and lower die head assemblies. They could also be reinforced with another layer of leaf or paper or polythene sheet when leaves like banana are used. The machine enables a skilled operator and one unskilled person (say a woman and a child) to earn a net income of about Rs 20 each day. The machine is being commercially munufactured and marketed by Ms H. K. Industries, Kankar bagh, Bahadur Gumti. Patna-800 016. Leaf cup machines in different sizes at a cost ranging between Rs. 3,100 and 3,500 each are available. Extra dies cost separately.

(R & D, Vol. .28, No. 2)

Fuel briquetting from agro-waste

Prototype Development and Training Centre of the National small Industries Corporation Limited, New Delhi, has designed and developed a fuel briquetting machine capable of converting saw dust coir waste, groundnut shell, pine needles, paddy stalks, wood shavings, bagasse, bark, plant leaves, pine cones, rice husk etc. into briquettes, These briquattes, mostly smokeless, can provide a calorific value about 4000 Kilo cal per kg and thus considered suitable for domestic as well industrial purpose for use in boilers, cookers, driers, etc.

(Research & Industry, June 1983)

Vaccine against encephalitis : has been made, according to the Deputy of the National Instittute of Virology, Pune. (Statesman)

Development Technology For Villages: PM

[redacted]

New Delhi, June 28– Prime Minister Indira Gandhi yesterday made an impassioned plea for development of technology in the rural areas, particularly to reduce the drudgery of rural women.

She called for special extension efforts to propagate the use of new developments covering the village, small-scale and cottage industries.

Addressing a conference of directors of National laboratories here, she said voluntary agencies should be associated with this work. The bio-gas programme needed to be expanded over larger areas. She hoped that CSIR laboratories could do much more in identifying various technologies to help the rural population, directly and indirectly.

The country's brilliant scientists and technologists, doctors and engineers were the apex of the society but the common people were its foundation. Therefore, they had to be educated in the widest senre of the word, made science-minded and given higher and more decent standards of living.

Referring to the need for creating an environment of development of technology, she said that the country's strong agricultural and industrial base and manpower reserve needed constant technological inputs for further progress. One should not hesitate to introduce changes in procedure to be able to use younger and creative scientsts.

The Prime Minister said that technology must suit local needs and make an impact on the lives of ordinary citizens by better and more cost-effective use of existing materials and methods of work. But this, however, did not mean that sophisticated technology be excluded.

"We have also to view technology in the broadest sense, ranging from improved bullock-carts and efficient, home-made wind or other renewable energy pumps to vaccines, which can be produced only by applying the highest reaches of immunology, and crops stemming from genetic engineering. Our diverse and varied requirements can be met only through the effective implementation of our technology policy," she added.

She referred to the suggestion for identifying areas for critical investment by reviewing on-going programmes, dropping peripheral projects and concentrating on certain forward areas and also those which have gaps in available indigenous technology. "I find, although things have improved the research being done is still not properly coordinated. Duplication can be avoided, and resources concentrated on areas like recycling of waste material and the full utilisation of by-products are urgent of our tasks."

The CSIR and its existing infrastructure must be harnessed to national goals which have already been identified, that is, coal petroleum, renewable sources of energy, defence equipment, forests, drugs, pesticides, etc. and others to be identified. "I have my reservations ebout pesticides and weedicides which also, I must repeat again, because every now and then we find from foreign journals that something which was passed and accepted has proved out to be extremely hazardous to health and I think we are prone to taking the work of the companies which approach us rather than having some independent research on the likely harmful consequences."

The CSIR industry meet was held in April, 1983 after 18 years Such interaction and dialogues should be more regular and be developed into an institutional framework also at laboratory level. Accompanied into an in-house assessment of available technology, this should enable users to be fully aware of indigenously developed and available technologies. Greater user participation in Research Advisory Councils was one possibility.

As technologists and scientists move into frontier areas, the responsibility on CSIR laboratories grows and they should become more aggressive salespersons to productionise and popularise their developments.

"Our technology policy statement referred to a preferential regime of incentives for users of indigenously developed technologies and for products and processes resulting from such uses through fiscal and other measures, because we have to neutralise or reduce the disadvantage suffered by such products in comparison with imported products, or those based on imported technology and known brand names."

"These inentives could be in terms of licensing and other industrial approvals or fiscal reliefs. There is need to create a climate for Swadeshi in which industrial units would welcome and promote the use of indigenous technology in preference to imported technology. This, in turn, would encourage new research in national laboratories, and within industrial units themselves."

ABSTRACTS

Housing the third world :
(*PPST Bulletin May 1983· p. 12*)

This study of the Madras group examines only two specific countries namely Malaysia and China. Their main thesis is to question the assumption that modernisation of production processes and modern life-style that accompanies it are the only or at least the inevitable path of development. According to them 'Modernisation that has implied the the concentration of resources and production processes in a few urban centres requires accommodating enormously more people in a unit area in comparision with village and has markedly changed the nature of housing and interaction of people in a community.'

The study claims that the traditional Malaym Kampongs not only use local raw materials, their designs are such that they allow enough ventilation and enough free paths for unrestricted social interaction. Kampongs are normally covered by a canopy of coconut and other trees that shade and allow for the use of open compounds even during noon time. The construction by modern designs on the contrary alienates the users from the design and construction process allowing for usual malpractices and the poor quality of construction despite advent of advanced techniques and professionals.

Similarly in China, rural housing scheme is based on the principle of 'public- aided self-help' where traditional building materials like timber and mud are used 'intelligently, deliberately and in a planned, manner making full use of the science of structures and exploiting to the maximum, opportunities that the local climate offered'. However, urban housing in China has failed to keep up with the growing urban population. The building effort depends upon scarce resources like cement, steel and concrete allowing no diversity whatsoever. The unfortunate part is the proposed goal to provide to every peasant family in China a brick and tile house with its own toilet and water supply by the turn of the century.

The paper argues in favour of a policy where people can be encouraged to build themselves on their own land and with local resources as the only meaningful solution to the problem of providing house to everyone. It stresses the need for respect for traditional technologies wich would demand a change in building regulations in the cities of most third world countries including India. They believe that '*Decolonization proper* would begin only when we start questioning the path of development and the vision of future that we have uncritically adopted from the west.'

(N. N. Mehrotra)

Innovation Eases the Cyclists Ride by Mick Hommer :
(*New Scientist 30 June, 1983· p. 948*)

This article had been written on the eve of a major National Bicycle Conference at Harrogate in England. It is claimed that the bicycle traffic in England has increased by about 70% in the last 10 years. Hammer believes that there are so many cyclists that even planners can no longer ignore them. In London alone the bicycle traffic has increased by about 400% in these years. Today there are about 10 million bicycles in Great Britain which correspond to about 60% of cars on the road. It seems that a third of all households now own a bicycle.

The more important aspects are several improvements in the design and technology of the bicycle. Though the plastic bicycles have not been very popular, the ones that are coming in more use are witn punctureless tyres and autmoatic transmission and with brakes that work in the wet also. In general the lighter bicycles of today are about 12-15 kg while the folding models with shock absorbers and adjustable handle and saddles are about 11 kg. The automatic transmission bikes with upto 5 gears can have 12–14 speeds. There have also been improvements in the bells with klaxons working on compressed gas that shout louder than even car horns. The improvements in painting technologies are producing bikes which shall be rust-proof for periods longer than cars also. Unfortunately, most of these improvements are not reaching developing contries including India which produces a very large number or bicycles. ▣ ▣

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रु. १० (संस्थागत)

WINDOW TO THE WORLD

Diesel fuel from plants

New steps in the departure from oil are at present being studied by the R & D division of Volkswagenwerk AG in Wolfsburg, West Germany. The goal this time is the biotechnical production of diesel fuel instead of a substitute for petrol. A species of plant which produces hydrocarbons: euphorbia, or spurge, as it is popularly known. The species includes the rubber tree cassava, and the castor oil plant. Certain types of this species contain no less then IO percent of their weight in hydrocarbons which can be used as a raw material for the production of a liquid resembling heavy oil. (German Research services)

Rare-earth elements increase crop-yield

Chinese scientists have proved that fertilizers containing rare-earth elements may considerably increase output of crops. Since 1979, such fertilisers have been tried out on experimental plots and the increase is between five to ten percent for the output of wheat, rice, peanut and soyabean. Such fertilisers can also enable rubber trees to produce more latex and increase the sugar content in water melons, sugarcane and sugarbeet.

(Indian Express, Nov. 6, 1983)

Highly efficient solar collectors

Glass tube solar collector which is twice as efficient as the conventional flat-plate collector at no extra cost has been developed at University of Sydney's School of Physics, Australia. The development was made poasible by a manifold system which eliminates the need of costly metal piping within the collector, allowing water to circulate directly inside the glass tube.

The system not only eliminates the need for most of the intricate copper piping that was previously necessary, but also obviates the need for a pump and heat sensors to circulate water around the system.
(Research & Industry, June 1983)

'Do-it-yourself' pregnancy test

China has devised a 'do-it-yourself' pregnancy test for millions of rural women so they can terminate pregnancies quickly. The invention is also expected to help family planning programmes substantially.
(Clipping Services Bulletin)

Anti-cancer drug

A group ef scientists from Japan have succeeded for the first time in developing the synthetic compound of Lipid A, which can be a major new anti-cancer drug. The chemical compounds of Lipid A have only recently been identified.
(Telegraph, Sept. I)

Thailand's low cost biogas digester

The Asian Institute of Technology, Bangkok has developed a low cost biogas digester (6 liters) to overcome problems such as high capital cost of digester installations, temperature fluctuations, blocking of inlet and outlet tubes and lack of provision for mixing the contents of the digester.

The biogas digester is similar to the fixed cover type, and has seven parts, namely, inlet, digestion chamber, gasstorage chamber, outlet, water pressure tank, gas vent and mixing device. Experiments have shown the following optimum parameters:
Composition of manure (pig-poultry) : 6.5 : 3.5 (by weight); Organic loading rate : 2kg volatile solids (VS/m^3 /day) Hydraulic detention time : 20 days;)
Gasyield : 0.291/gvs/day (at ambient temperature with manure feeding and slurry drainage once a day.
(Adab news, May-June, 1983)

Improved Pakistani Chulha

The Pakistani Design Institute in collaboration with Government of Switzerland has developed a family cooker, based on a Netherland design which is claimed to save at least 50 percent fuel in comparison with an open fire. It has been designed so that its parts can easily be fabricated. The *choolha* can be set up in an hour. A wide range of substitute materials can be utilized so that the stove can be manufactured by local village craftsmen.

By using a chimney, all smoke is eliminated from the room, thus cutting down the risk of eye and bronchial diseases. All types of solid fuels or wood up to a length of 45 cm can be used.

Japanese Hybrid Solar Collector

Sanyo Electric Co. has developed a hybrid type solar cell/solar energy collector named "Amorton Heat Pipe Solar Collector" that is unitirad assembly in which amorphous solar cells are incorporated in a solar energy collector consisting of heat pipe and evacuated glass solar energy collector.

Owing to this design, the hybrid solar energy collector system is capable of generating electricity and thermal energy simultaneously.

The solar system can be employed for providing solar heating, cooling and hot water supply in house-holds and buildings.

(Adab News)

Survey Of the Energy Consumption of Karla Village under the All India Coordinated Projet On Cooking And Fuel

— Sadhana Deshmukh & [illegible] (CSV)

Vast majority of Indian population is living in rural areas and in these areas people use traditional chulhas for cooking. Rural people use along with firewood, dry agricultural waste materials which are general crop materials in the particular region i.e. in Vidarbha region of Maharashtra State, cotton is a main crop. In each village of Vidarbha region cotton stalks are used as fuel. Besides this, other agriculture wastes like 'Tur' stalks (Cajanus cajan) and cowdung cakes are also utilised. Farm owners fulfil their needs by cutting trees from their own farms but agricultural labourers do not possess land so they have to face much difficulty for collection of fuel.

Division of labour in our society is such that generally woman is burdened with the work of collection of fuel. She has to do this work, besides the daily routine work and if the woman is from labour class, she is entrusted with the achievement of the triple task : one is house-hold duties, other is wage earning and third is collection of fuel and besides this she has to do many other duties. Particularly rural women from labour class do not have access to improved and labour saving instruments for cooking due to the costly nature of these instruments. So modern technology is restricted in itsuse among lower and upper middle class women only. Recently, Department of Science & Technology is trying to evolve labour saving techniques for women and under this has sponsored one all India coordinated project on cooking and fuel. Under this project a survey of the energy consumption in a village has been carried out.

AIM OF SURVEY :

1) To find out the fuel need of a family per day.
2) Time required for the collection of fuel.
3) To encourage each family for plantation of fast growing varieties of trees like Subabul for fuel.

These trees can be grown-

i) In the premises of ones' house.
ii) On the fencing of farm land,
iii) On the barren land of village owned by gram panchayat.

METHOD :

One questionnaire was prepared for this survey and 29 questions were included in the questionnaire. This sample survey was carried out in a village named 'Karla', 6 Km. from Wardha town. Population of this village is near about 70 families. For this survey all the families were taken up. In these 70 families, people from all social and economic classes were included. Each family was personally visited and questions about fuel were asked and after that the data was incorporated in the proforma.

OBSERVATION :

According to the survey carried out in Karla village, of 70 families about socio-economic conditions and fuel consumption pattern, the collected data is given below :-

TABLE

PROFESSION:

Category	No. of families	Percentage
Farmer	24	34.2%
Contractual labour on annual basis	22	31.4%
Agricultural labour	16	22.8%
Service	4	5.8%
Artisans & Trade	4	5.8%
	70	100.0%
Families using traditional chulhas	67	(95.7%)
Families using improved chulhas (Magan Chulha)	3	(4.3%)

(It means that 95.7% population use traditional chulhas.)

General Fuel Usage :

Firewood	47 Families	70%
Cotton stalks, 'Tur' Stalks (Pulses & cowdung cakes	21 ,,	30%

From 49 families using firewood :

— Medium farmer (5-15 acres)	....	16	32.6%
— Contractual labour on annual basis	......	16	32.6%
— Small farmers (1-5 acres)	......	10	20.4%
— Service	......	4	8.2%
— Trade + Agricultural Labour	......	3	6.2%
		49	100.0%

From 21 families using cowdung cakes, cotton stalks and 'Tur' (Cajanus cajans) stalks only

— Agricultural labour	.....	14	66.8%
— Contractual labour on annual basis		5	23.8%
— Small farmers (1 — 5 acres)	.....	2	9.6%
		21	100 00%

It is clear from the above Table that out of 70 families, 49 families generally use firewood as a fuel and 21 families generally use mixed fuel of cowdung cakes, cotton and 'Tur' stalks. Out of 49 families using fire wood, 16 families are medium farmers (32.6%) and 16 families (32.6%) are contractual labourers on annual basis and they get firewood from their employers (farm owners), 10 families are small farmers owning on average 2 acres of land (10%). 4 families are from service group (8.2%) and besides this they are small farmers, So they can have access to the dearest fuel ike firewood. Remaining three families are agricultural labourers and traders.

Out of 70 families, remaining 21 families use generally cotton stalks, 'Tur' stalks (Pulses) and-cowdung cakes. Out of 21 families using this mixed fuel, 14 families are agricultural labourers (66.6%) who do not possess their own land so that they do not have access to the availability of fuel. These people do not possess any means of production so they are compelled to use materials like cotton stalks, cowdung cakes having low thermal efficiency (and producing smoke) which are easily available to them, But through the personal interviews, we found that nowadays even they po not get cotton stalks easily, If they want to collect cotton stalks from the farm, they have to give particular portion of cotton stalks collected in a whole day to the land owner.

From these observations it is inferred that whenever ownership on the means of production weakens the socio-economic condition of that strata becomes worse and contsumptive pattern of necessities of life also decreases with that. It means consumption of fuel is co-related to the means of production

Sources of Fuel :		No of families	(%)
— To purchase from market	...	Nil	
— Collection from forest plus farm land	..	49	70%
— Cutting trees from own land	...	21	30%
		70	100%

It is found that 49 families (70%) fulfil their needs of fuel by collecting cotton stalks from land owned by them, firewood and wood choppings from forest. 21 families (30%) collect cotton stalks, and cut trees from their own land. It means most of the people are dependent on land owned by others and also on government forests.

Some people use bullock carts for transportation of fuel and many bring it on their heads. Women from each family have to go to farms or to the forests for collection of fuel so that the women expressed that they have to take lot of pains and spend most of their energies on collecting fuel. And the women from labour class who do not have any other income source, apart from their own labour, have to face physical as well as social strain. Such families were 46.8% in this village. These families have to give one half or one third part of the collected fuel to the land owner (if it is collected from other's land).

For collecting fuel, each family has to spend two and half hours on an average every day.

In 77.2 families the fuel was collected and also brought up by women. In the remaining 22.8% families, this particular work was performed by men. But they brought it in bullock carts. They do not take physical strain to bring it upto their houses.

Out of the 70 families, 32 families brought the fuel from up to 1 kilometer distance from their residence. The remaining 30 families brought it from 1.1 to 3 km. distance. Out of these 38 families 22 families go on foot and 16 families are using bullock carts.

(Contd. .)

Almost all families use Chulha twice a day. It is utilised for 1 to 2 hours for once in a day that means the whole day they utilise the chulha for two to four hrs.

TABLE

Time Required For Using Chulha Once A Day

Time (in minutes)	No. of families	Percentage
60-90	48	68.5
90-120	21	31.5

It is very interesting as well as useful to see the socio-econmic conditions of these families. The following table can be helpful to explain :

TABLE - A

Socio-Economic Condition Of The 48 Families :

Occupation	No. of families	Average no. of family members	Time required for cooking once a day
1. Contractual labourers on annual basis	16	5	1 to 1½ hrs.
2. Agricultural labourers ...	12	4	do
3. Small farmers (1 to 5 acres)	6	4	do
4. Medium farmers (5 to 15 acres)	6	5	do
5. Service	5	3	do
6. Artisans and traders	3	4	do

TABLE - B

Socio-Econmic Condition Of The 21 Families

Occupation	No. of families	Average no. of family members.	Time required for cooking once a day
1. Medium farmer	8	7	1 to 2 hours
2. Contractual labourers on annual basis	7	6	do
3. Small farmers	6	8	do

The two tables give us an idea about the relationship between the time required for using chulha once a day and socio-economic condition and number of members in the particular family.

It is inferred from the observations that where socioeconomic status of the family is high and the number of family members are more, a rate of food consumption is also more. So it takes comparatively more time for cooking than in poor families.

The amount of fuel required for each family in a week was calculated from the daily amount utilised by each family. For this purpose 21 families were selected out of the 70. The figures are given in the following table :-

Type of fuel	(Out of 21 families) **No. of families**	**Percentage**
Fire wood	11	52.3%
Wood chopping	2	9.5%
Cotton stalks, 'Tur' stalks & cowdung Cakes	21	100%

This table also shows that almost all people (100%) in rural area utilise cotton stalks and other dry materials from crops as main source of fuel and firewood as supplementary fuel.

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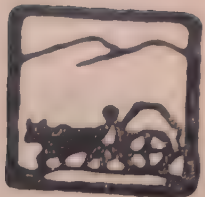
Taking Technology to Villages

Shri Harinath Misra, Union Minister of state for Rural Development

(*Adapted from his speech inaugurating CART General Body on 18th 1983.*)



Council for Advancement of Rural Technology (CART) has been set up by the Ministry of Rural Development with advancement of technology relevant to rural areas as the principal objective. It is of the utmost importance for rural development that the benefits of technological advancement in various fields reach rural areas and help in transforming the rural scene and in ameliorating the lot of the rural poor. Rural Development and improving the lot of the rural poor have been amongst the major concerns of the planning process in our country since independence. The successive Five Year Plans have laid stress on these aspects. It is of vital importance that we make sustained and dedicated efforts for 'Antyodaya': the essential preliminary step of the task " to wipe every tear from every eye". In order to achieve this objective several important programmes have been launched by the Ministry of Rural Development, such as Integrated Rural Development Programme (IRDP), National Rural Empoyment Programme (NREP), Training of Rural Youth for Self-Employment (TRYSEM), Minimum Needs Programme, Drought Prone Areas Programme, Desert Development Programme and land reforms including distribution of ceiling surplus land. To get the maximum out of these programmes, introduction of latest technology suited and adapted to our conditions in rural areas is essential. It is here that the Council for Advancement of Rural Technology has to play a vital role.

The skill and craftmanship of our village artisans have been well-known; but these are being lost on account of stiff competition by the organised sector which has taken the maximum advantage of technological developments. It is, therefore, essential that while introducing the new technologies in the non-farm sector, care is taken so that the village industries not only survive but flourish and expand also and the village artisans and craftmen again capture their past glory. This will also open up new avenues of employment to our rural youths in their own areas and thus prevent their attraction by and migration to urban centres. While introducing technologies we have to keep in view the conditions in the various rural zones and in their light to modify them (technologies) suitably. A delivery system will have to be evolved through which these technologies can reach the romotest corners of the country. Further, this system should also be able to transmit local problems and needs to the research centeres so that adequate solutions may be found and the process of growth and development timely facilitated. These are the important tasks to which the Council for Advancement of Rural Technology will have to address.

Considerable amount of work is being done in the field of technological development in our country by various institutions such as agricultural Universities, Indian Institutes of Technology, Polytechnics, Khadi and Village Industries Commission and the C. S. I. R. In respect of farm technologies, systematic and sustained effcrts has been made not only to develop but to ensure dissemination through a net work of institutions under I.C.A.R. Similar arrangements have to be made for other fields, particularly the technologies relevant to rural artisans and landless labourers. CART will have to establish linkages with all possible research centres and institutions so as to avail of the knowledge and the facilities available in these for furtherance of its objectives. There should be a coordinated and well–directed effort in this field and CART may, on no account, be found failing or faltering. In areas where institutions are already available, duplication will have to be avoided; but where there are gaps, efforts will have to be made to bridge them. It will also be necessary to keep in touch with the international organisations working in this field. The growth of technology is a continuous process and a large number of institutions, both national and international, are involved in this. We have to keep in constant touch with all these developments so that stagnation does not set in and the benefits of latest achievements in the field of applied science and technology are available for development of our rural areas.

Thus, it is clear that CART is expected to play a key role in both the development and dissemination of rural technology. This will result in preservation of the best in the traditional technology and, at the same time, in introducing new technical devices to increase the productivity in rural sector. All these will help develop rural entreprenurship, creation of employment opportunities and additional income generation for the rural-poor. The introduction of new technologies coupled with induction of needed inputs and creation of necessary infrastructure will help transform the rural economy. May we hope that CART will dedicate itself to the achievement of these goals.

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Biogas Promotion and Voluntary Agencies

The Government of India convened a meeting of Voluntary Agencies in July in order to mobilise the voluntary effort all over the country and motivating the volagencies for the promotion and implementation of the programme for the development of biogas and other alternative energy achievements in the field, their targets for the future, and when asked, spoke at some length of the problems they faced in the implementation of the National programme on Biogas. Among the bottlenecks were finance- the tardy, meagre and sometimes non-existent flow of funds as incentive money and, turn-key job fee. Biogas plants in most places do not seem elegible for bank loans, thus making the task of financing, construction a difficult matter. It was suggested that financing institutions should be made aware of the Government's sincerity in making this programme a success and that bonus be asked to consider applications for bank loans with due sympathy.

Many States do not rate the implementation of the biogas programme very high in their list of priorities so that facilities, e. g. the allocation of levy cement, are not made at reasonable price with the result that the material has often to be bought from the open market which again steps up the cost of construction.

Both volagencies and the Government are in agreement on the need for a continuous programme of training to train more masons and to provide refresher training to those already in this field. Last year the Govt. funded the training programmes-this year the funds have not been made available so far. The volags were already involved in biogas promotion but they extended themselves in order to work with the Govt. for the attainment of mutually accepted goals. Volags are financially in order to fulfil (and sometimes exceed) the targets. Since the targets were for a phased programme of three years, most agencies felt that the funds for training would continue. This has not happened.

Other matters discussed were the cost of transportation in difficult-terrain & remote areas; non-recognition of the Janata Plant as a fundable project by State Government; the need for regional promotion centres which will deal with problems peculiar to the area, monitoring of the progress of the programme and transfer of suitable technologies; the development and production of audio-visual aids for the dissemination of the technology; and the need for seminars and workshop at grass-roots for State and Central Government officers, band officials Volagencies and block/district level functionaries in order to make known the Centre's concern at the growing energy crisis and environmental degradation.

BIOGAS PLANT WITH CLAY DIGESTER & CLAY GASHOLDER

It is reported that Mr. B. R. Gawade, Industrial Supervisor, Maharashtra State Khadi & V.I. Board, Sangli, has set up a biogas plant of One M^3/day using clay as the raw material both for the digester and gas holder. This plant was set up in 1980 and is reported to be working satisfactorily.

The Digester

The digester is built using clay rings with the following composition :

River mud	32%
Black cotton soil mud	25%
Road dust	7%
Horse dung	16%
Charcoal ash	20%

Dimensions of the ring are as follows :

Height	2'-6"
Diameter	3'-2"
Thickness	2"

The rings were sun-dried for about 10 days and baked in the kiln at 700°C. After baking, the dimensions of the ring were as follows :

Height	2'-3"
Diameter	3'-0"
Thickness	0'-1½"
Weight of the ring (when wet)	70 kg.
Weight of the ring (when dry)	47 kg.

While building the digester, overburnt bricks were used for foundation over which 4 rings of the above dimensions were fixed using cement as the binding material.

Gas Holder

The composition and process for manufacture of digester rings have been adopted for manufacture of gas holder. The dimensions of the gas holder are as follows :

	Before baking	After baking
Height	3'—0"	9'—9"
Diameter.	3'—0"	2'—9"
Thickness	0'—1"	0'—¼"

Gas pressure at the point of use which is 25', in this case is reported to be 5.5" water column.

Other Particulars

Capacity of the gas plant	1M^3/day
Retention period	50 days
Capacity of the gas holder	0.5 M^3
Daily input repuired	22 kg. of cattle dung
Gas yield/day	1M^3
Total members of the family for whom cooking is done.	2 adults and 3 children.
Total cost of the plant in 1980. (Without other accesories.)	Rs. 900/-

▣ ▣

CHIPKO: The Feminist Movement

The Chipko Andolan-the movement to hug trees- is probably the world's most well-known grassroots ecodevelopment movement. Chipko activists have been subject of newspaper articles and television programmes from India to the United States. They have attracted the attention of environmentalists, Gandhians and various people interested in the process of social change. Though pitted against the forest policies of the State of Uttar Pradesh, the movement has been praised by successive Prime Ministers. But despite its fame, the movement's objective of changing the State Government's forest policy and the current relationship of the hill people with forest resources, remains unfulfilled. Observers continue to be confused about what the movement actually stands for.

The Chipko movement was born one morning in March 1973 in the remote hill town of Gopeshwar in Chamoli District. On that fateful day representatives from a sports goods factory situated in Allahabad reached Gopeshwar to cut 10 ash trees near village Mandal. The villagers courteously told them not to do so but when the contractors persisted, they hit upon the idea of hugging the earmarked trees. The next day the sports goods manufacturers had to return empty-handed.

Some weeks later the same contractor surfaced at Rampur Phata, another village some 80km away from Gopeshwar, with a fresh allotment from the forest depatment. As soon as the villagers of Gopeshwar learned of this, they marched to Rampur Phata with drums and songs, gathering more people on the way. A confrontation ensued and the agitators hugged the earmarked trees to foil the contractors once again.

The Chipko movement reached its climax in 1974 when the women of village Reni, some 65km from Joshimath, got involved in a dramatic way. One day when their men were away in Joshimath protesting against the auction of a forest neighbouring Reni, the contractor arrived at the village to begin felling, taking this as an opportune movement. Undaunted by the number of men or their axes, the women of Reni, led by Gaura Devi, an illiterate woman of 50, barred the path to the forest which went through the village. As the women stood there, they sang: "This forest is our mothers home, we will protect it with all our might."

The genesis of the Chipko movement has both an ecological and an economic background. The Alkananda valley in which the movement originated was the scene of an unprecedented flood in 1970. The tragic aftermath of this flood left a deep impression on the hill-folk and, with it, soon followed the appreciation of the vital ecological role that forests play in their lives.

The villagers here have also seen and resent the manner in which successive governments- beginning with the British- have taken away their forest wealth and turned it into a resource bank for faraway urban markets. Even for minor forest produce and articles of daily necessity like firewood, the local people have been forced to become thieves in their own homeland. Slowly, the entire ecology of the region has changed. The local people prefer the broad-leaved oak. But with the demands of the industrial culture increasing, oak forests have been destroyed and replaced extensively by the chir pine. Today, when the local villagers want to get oak wood to make ploughs, they are allotted pine trees, whose wood is useless for this purpose.

When the Dasohli Gram Swarajya Mandal– the Gopeshwar based organisation that has been at the forefront of the Chipko movement since its early days- decided to set up a small factory to use the pine resin, it was persistently discriminated against in the supply of the raw material. While the allotted quantity was small, the price was much higher than the prices at which the resin would be allotted to the larger factories down in the plains. No amount of persuasion of running to Lucknow seemed to work. The factory still limps along.

The Non-violent, action-oriented Chipko movement has greatly helped to unite the people and focus attention on the mismanagement of forest resources. Its Gandhian character has brought it considerable sympathy. The expert committee set up by the State Government to enquire into whether the Reni forest should be felled found that the Reni women were more right from a scientific point of view than the forest department. This gave the movement considerable respectablity. The committee concluded that because of the highly sensitive of the watersheds situated deep in the Himalayas, all felling should be banned to allow regeneration. These developments have not made the forest department change its forest policy but at least in the Chamoli district it is no longer in a position to implement its policy of selling forest to private contractors.

Meanwhile, as the years have gone by, the movement itself has acquired two distinct streams of thought marked by its two leaders, Chandi Prasad Bhatt from Gopeshwar who pioneered the movement, and Sundarlal Bhuguna from silyara in the Tehri region. The operational style of both these leaders is totally different. While Bhatt is a grass-roots worker and believes mainly in organising the people, Bahuguna, a journalist, is a publicist par excellence. Though Bahuguna has also organised some protest activities in his region for instance, Chipko activists in Henwal Ghati once went to the forest to bandage the wounded trees with mud and sacking to protest against the indiscriminate tapping of pine trees- his main focus has been on spreading the message of Chipko far and wide. In 1981, Bahuguna started on a foot march from kashmir to Kohima to campaign against deforestation. Bhatt, on the other hand, has dug deep roots in the Chamoli region. He is, as a result, far less known than Bahuguna. Bhatt has realised that if the local village communities have the right to control their surrounding resources, they must also undertake conserve and develop those resources. So he has organised the country's largest voluntary afforestation programme through ecodevelopment camps sponsored by the Dasohli Gram Swarajya Mandal. These bring together local villagers, students and social workers who have planted over a million trees. The survival rate of these Chipko plantations has been an astonishing 85-90 percent in most cases. Bahuguna, however, tends to dismiss this activity as irrelevant at this stage of the movement against deforestation and concentrates all his writing and speaking power against the forest deparments.

Not withstanding the divergent opinions of these leaders, the real strength of the movement are the women of the region. Except for a few "organised" events as at Rampur Phata or Henwal Ghati, the Chipko movement essentially consists of a string of spontaneous confrontations in which none of the so-called leaders were present. Women, acting entirely on their own rose up on the spur of the moment. While in Reni, this protest was against a timber contractor, in all other cases the protest was against their own cash-hungry men, who could not care less if the forest was destroyed while their women had to walk for many more miles to collect their daily load of fuel and fodder.

Two dramatic incidents have taken place in the Chamoli region: the first in 1978 in the Bhyundar Valley, the area that leads on to the famous Valley of Flowers, and the second in 1980 in the village Dungari-Paitoli situated in the Pinder watershed, which is so remote that the women there had not even heard of the Chipko movement.

In Bhyundar, the women were confronted by their own relatives from a neighbouring village who were going to cut trees to meet the fuel needs of the 250,000-odd pilgrims that visit the famous Badrinath Temple every year. As the men of the Bhyundar village had refused to cut the trees earlier, the forest department had stealthily given the contract to a cooperetive society in a neighbouring village. The Bhyundar women stole the axes of the men and refused to return them until they agreed to go back.

In Dungri—Paitoli, the battle was much more bitter and set wife against husband and mother against son. In 1978 the Government's horticulture department negotiated with the male-dominated panchayat for the acquisition of a nearby community forest to set up a potato seed farm. The men were led to belive that they would get employment in the farm and with its construction, the village would get a motor road, electricity, health centre and its primary school would be upgraded to high school. When the women learnt that the forest had been sold, they protested strongly. The destruction of the forest would have meant walking at least another five km everyday to fetch fuel and fodder. Emboldened by the support they received from the Chipko activist like Bhatt, the women refused to let the forest be destroyed. After a bitter struggle in which the women were strongly opposed by their men and threatened with arrests by the district administration, the women finally won. None of the men's tactics, including threats to Chipko workers and spreading of rumours that bowing to the women would mean the village youth would not get employment in the army, worked in the end.

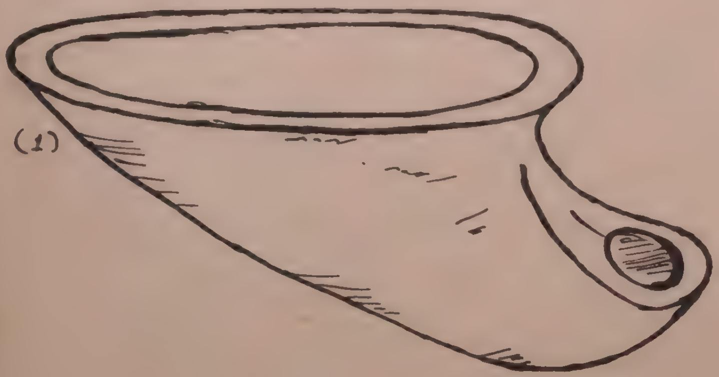
At its heart, thus, the Chipko movement is very much a feminist movement. It has not only brought forth in a dramatic manner a greatly increased understanding of the divergent interests of local communities and State bureaucracies in the

(Contd. on page 21 . .)

RASULIA WATER –

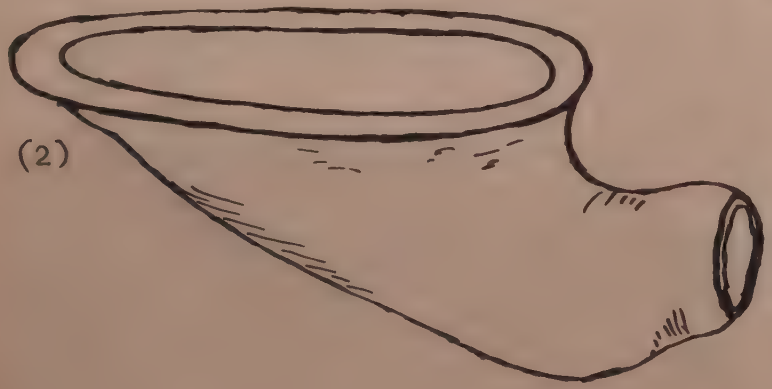
WAYS OF INSTALLING RASULIA TYPE WATER SEAL LATRINE PANS

Two types of pans are being made using Rasulia Plastic Moulds:



The standard water seal pan is intended for mounting directly over the digestion pit. This may be done in any of several methods described below.

The current price of this pan at Rasulia is Rs. 3·60.



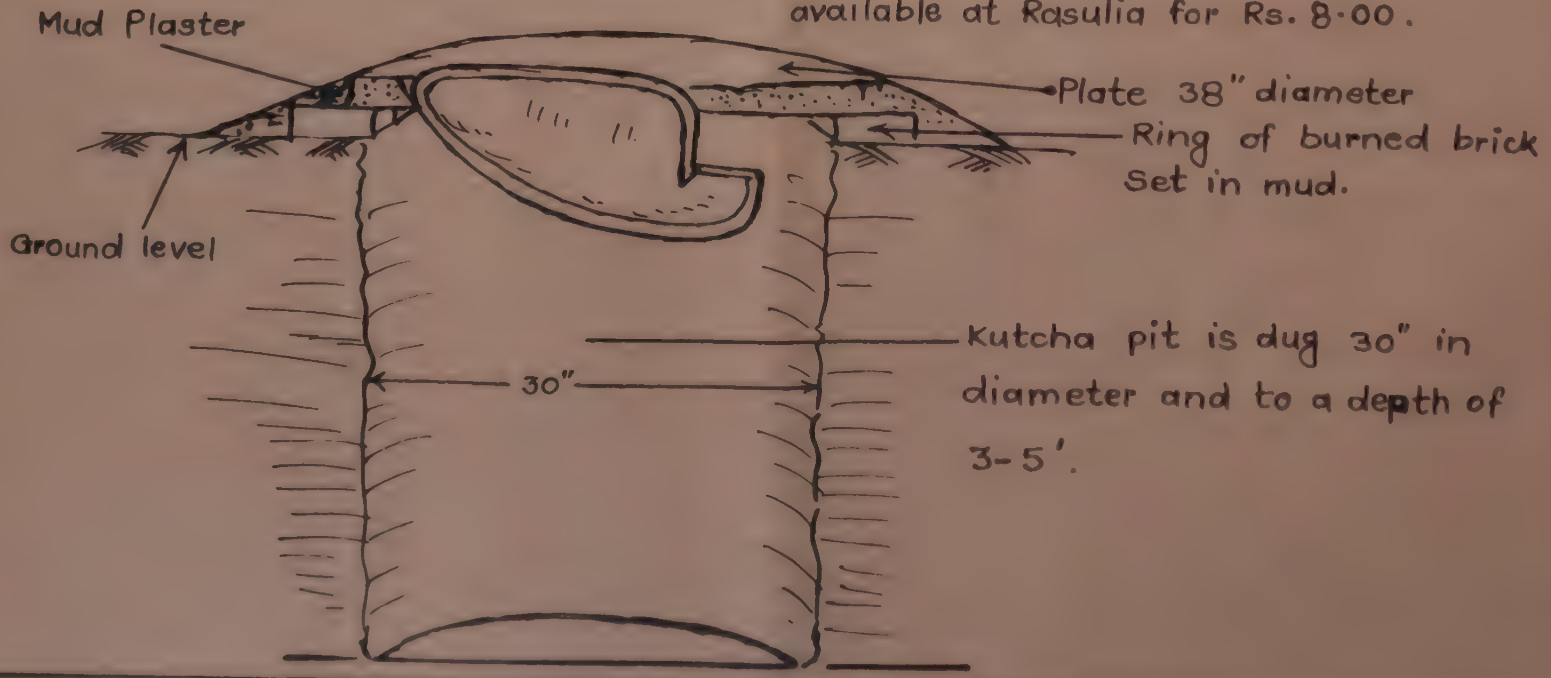
Special water seal pan with pipe spout. This is intended for connecting by pipe to a digestion pit outside the building. It is well suited to conversion of clean-out type to water seal type.

The present price at Rasulia is Rupees 5·00.

The Simplest kind of installation

Standard Rasulia Pan mouted in plate placed over kutcha pit.

Pan mounted in 38" diameter plate is available at Rasulia for Rs. 8·00.



Kutcha pit is dug 30" in diameter and to a depth of 3-5'.

-SEALED TOILET

A More Permanent Installation

Standard Rasulia Pan in plate set over pucca pit of brick laid dry.

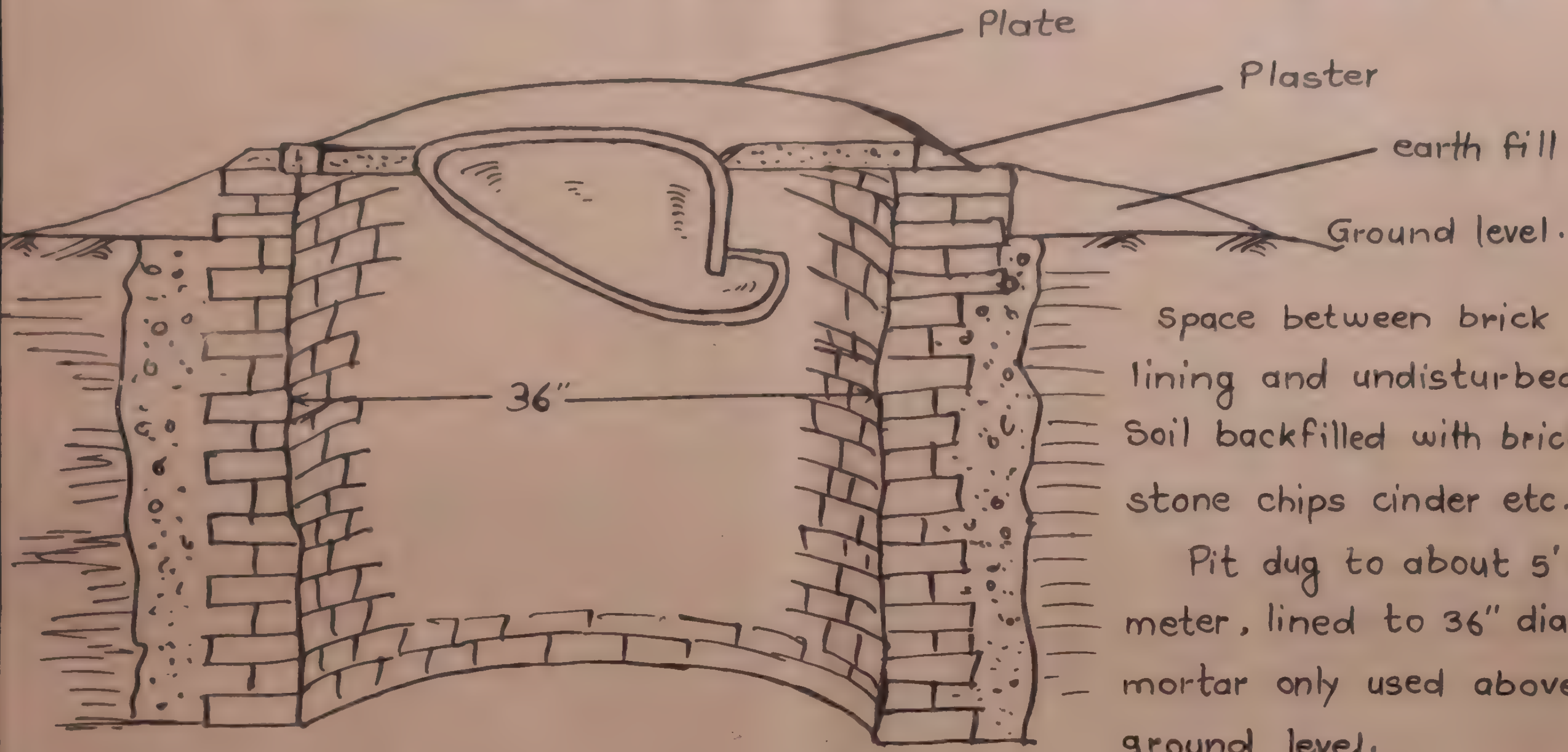


Plate
Plaster
earth fill
Ground level.
36"

Space between brick lining and undisturbed Soil backfilled with brickbats, stone chips cinder etc.

Pit dug to about 5' diameter, lined to 36" diameter mortar only used above ground level.

A similar installation using concrete well lining rings as lining. This is quick, permanent but somewhat more expensive.

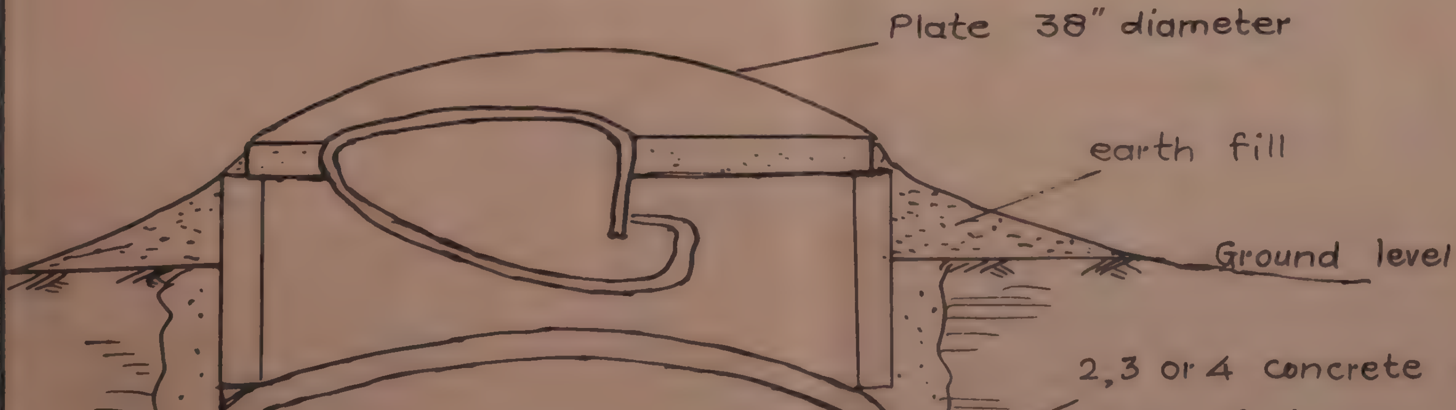


Plate 38" diameter
earth fill
Ground level

2,3 or 4 concrete well rings of 3' internal diameter.

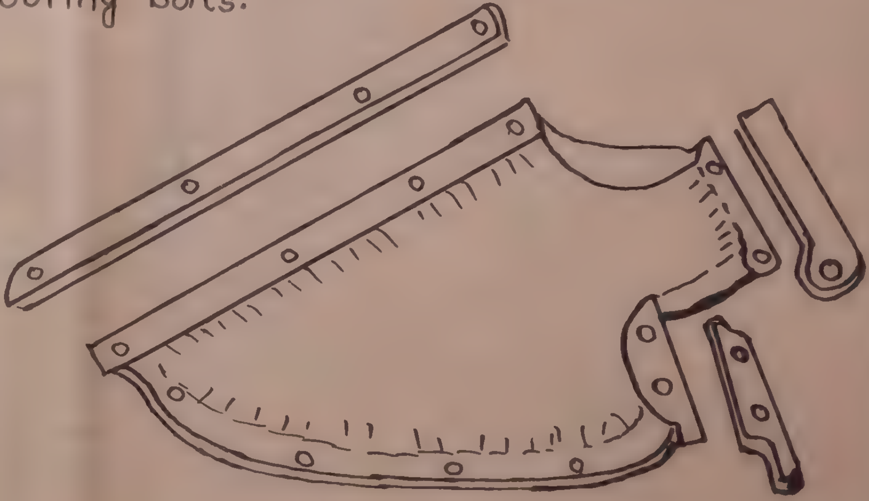
space of $\frac{1}{2}$"- 1" maintained at ring junctions by stone or chips.

gravel, stone chips, broken brick or cinders beneath rings (3") and as backfill outside rings.

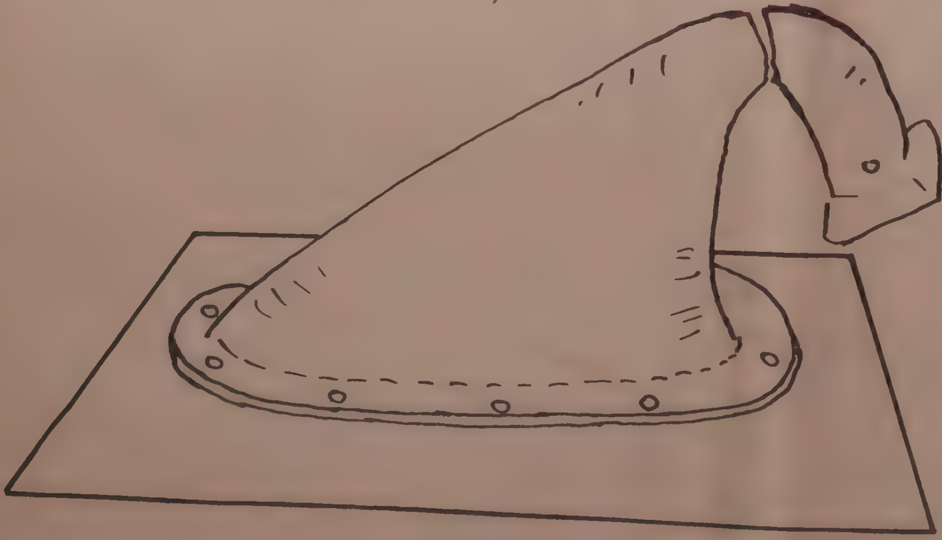
DESCRIPTION OF PLASTIC MOULD

The outer part is made from two moulded pieces of plastic which are permanently fastened together with a piece of folded plastic strip down the sloping side, and bolted on with roofing bolts.

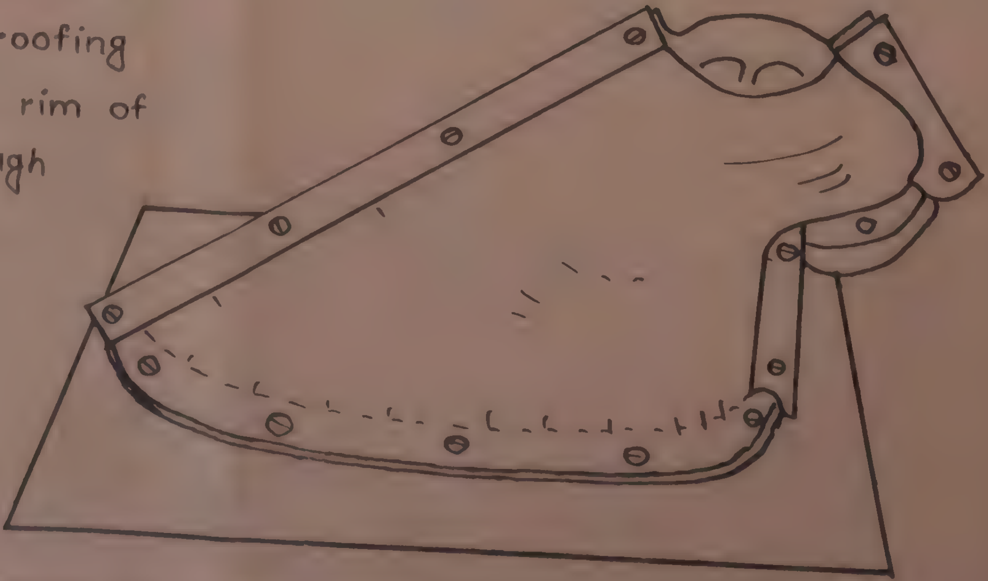
Two similar/smaller strips along the opposite side complete the outer mould. These two strips are removable for use of the mould



The inner part is also made from two parts; the 'bowl' and 'trap' parts respectively.

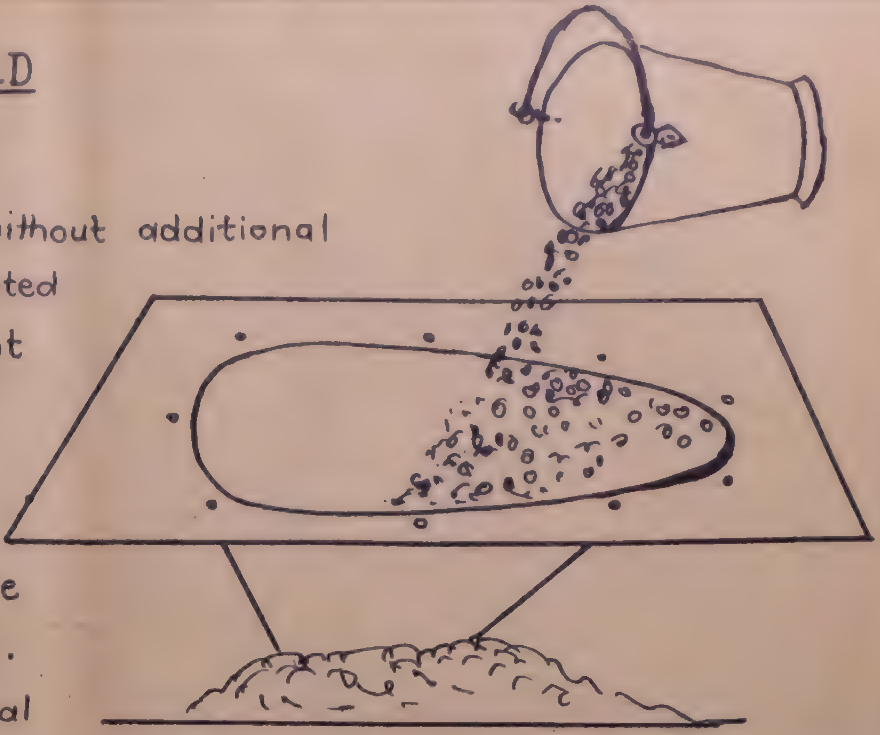


The inner and outer parts of the mould are held to-gether in there proper relationship by 12 roofing bolts: 10 along the bottom rim of the bowl part, and 2 through the base of the trap part.

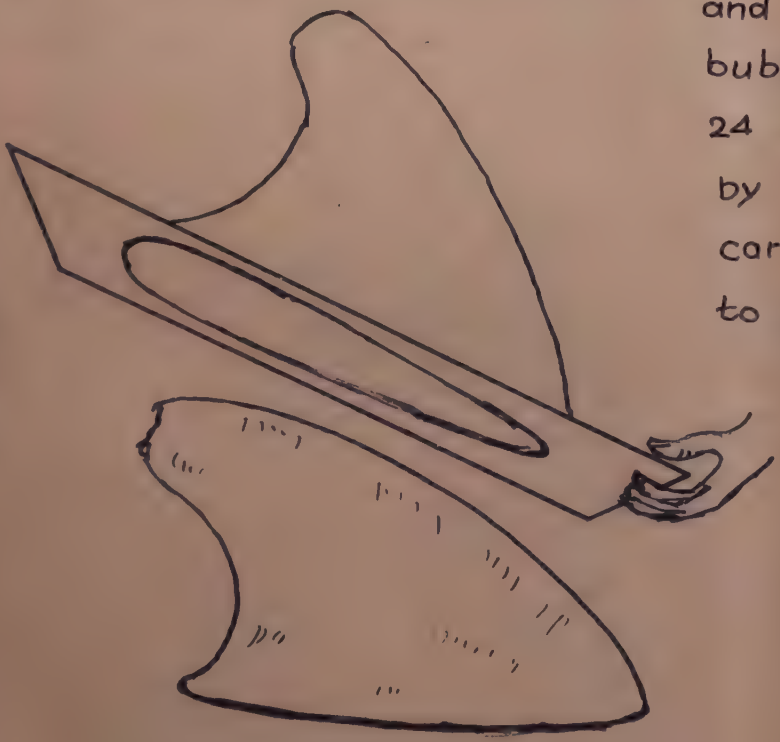


USE OF THE PLASTIC MOULD

PRELIMINARY WORK



If the inner mould is used without additional support it would sag and get distorted in use. It is therefore recomended that for each mould in use, a stiffener is cast in the following manner: Remove the larger, 'Bowl' part from the mould and lightly oil the inside portion with cooking oil. Support it in sand in a horizontal position as shown here. Mix about 9 litres of concrete using one part of cement to two parts of sand and three parts of $\frac{3}{4}$ inch large stone chips, and mix with enough water to give a plastic consistency. Fill the hollow of the mould completely with this mixture to the level of the rim, and vibrate it a little to remove any air bubbles. Allow this to set for at least 24 hours. Remove the 'stiffener' casting by inverting the mould and lifting it off carefully. A little tapping may be needed to get it separated.



This 'stiffener' is subsequently used under the inner mould whenever latrine bowls are being cast. (If only one or two bowls are to be cast at a site the making of this stiffener may be omitted, and the hollow may be filled with stiff clay. This clay must be removed before the inner form is removed from the casting).

CHARCOAL FROM CORN-COB

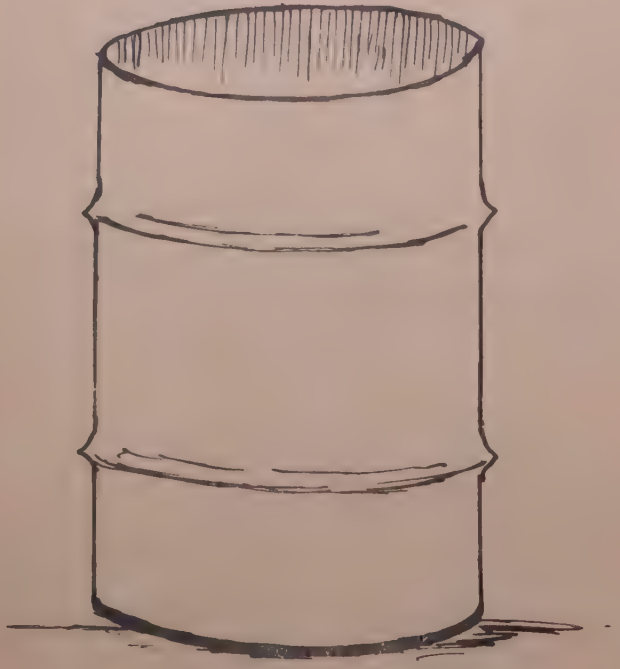


Fig. No. 1 :- 200 litre oil container.

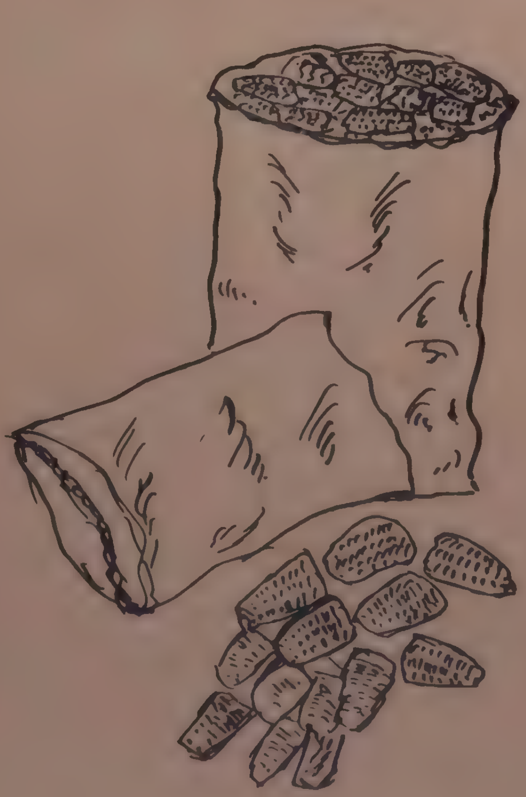


Fig. No. 2 :- Divide one sack of corncobs into three portions. Then fill the drum with one portion of the corncobs.

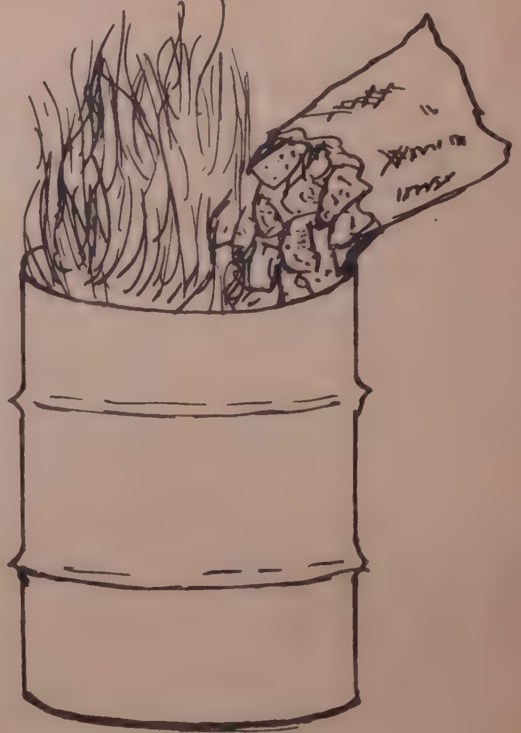


Fig No. 3 :- Completely burn the first portion, till you attain smokeless flame.

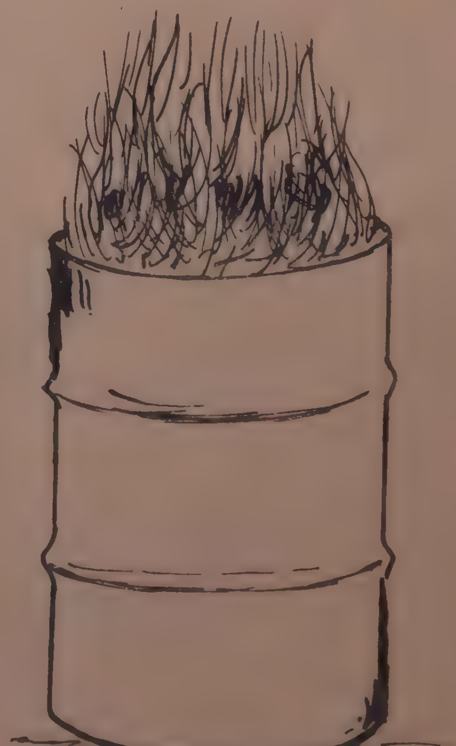


Fig. No. 4 :- Add rest of the corncobs and burn them completely.

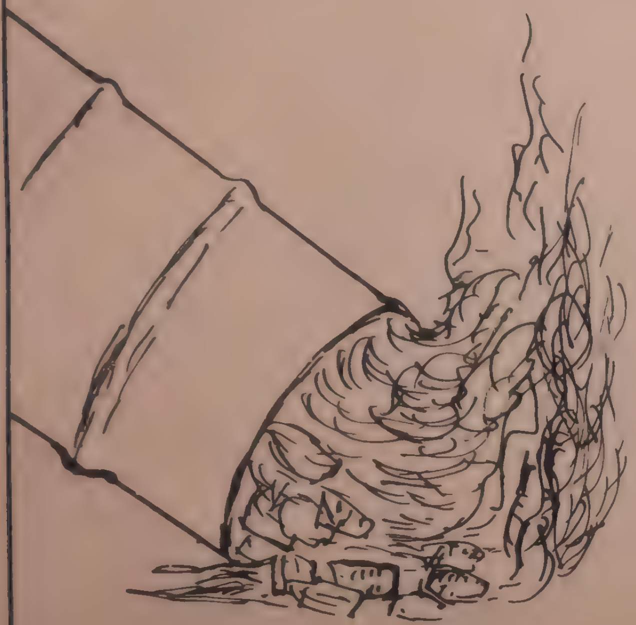


Fig. No. 5 :- Pour the completely burnt charcoal on to the floor.

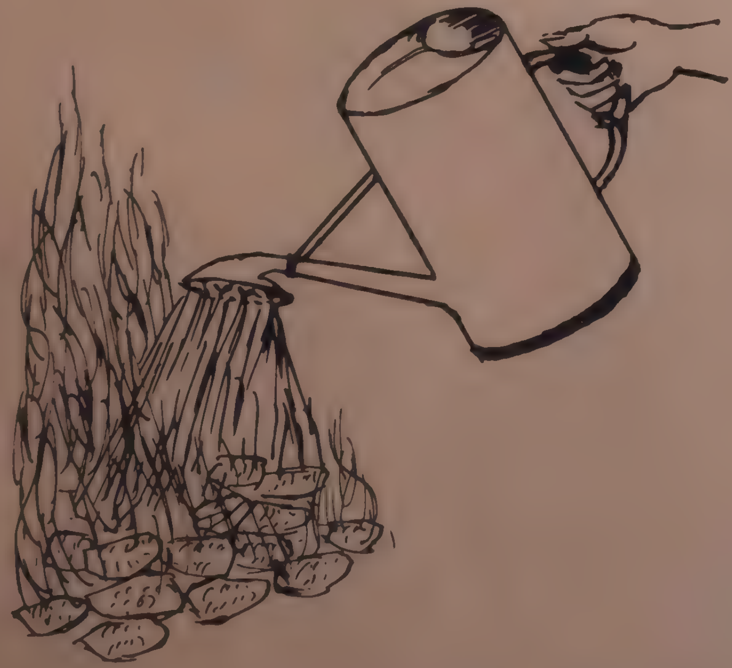


Fig No. 6 :- Extinguish fire with water from watering can.

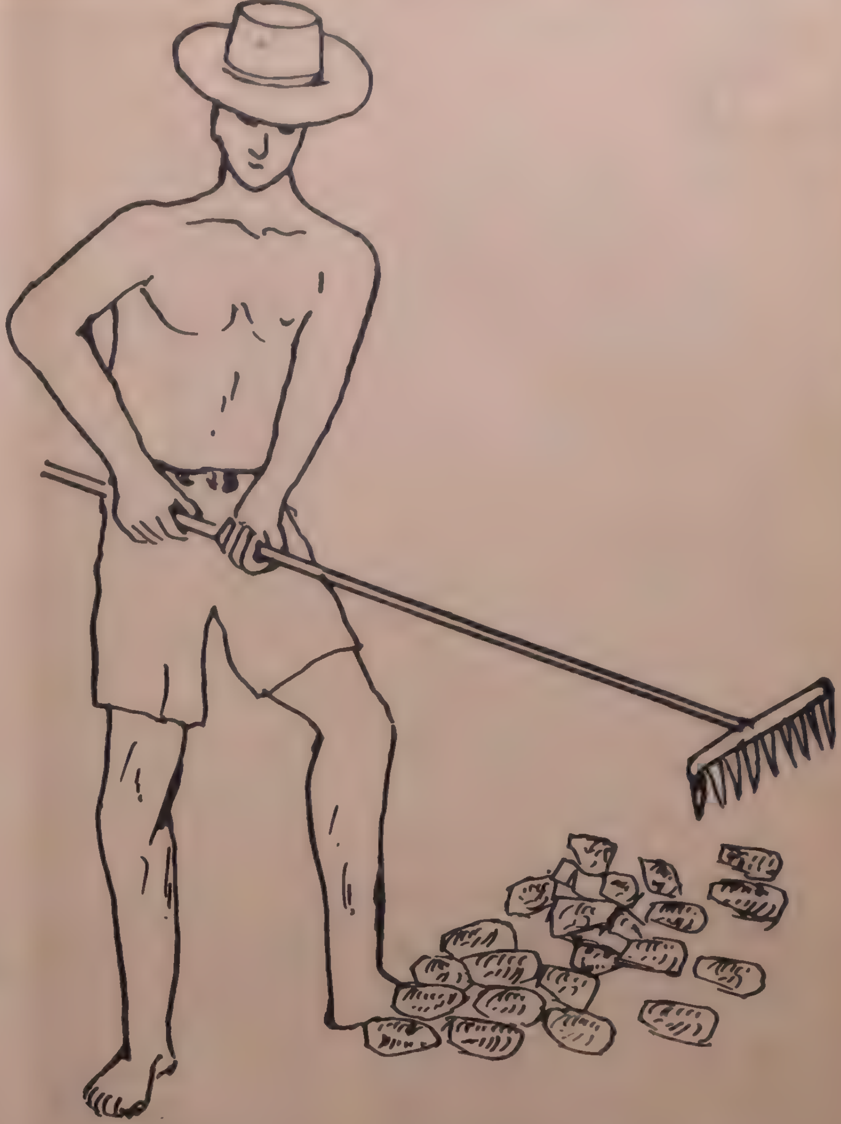


Fig. No. 7 :- Level down the charcoal and leave to dry in the sunlight.

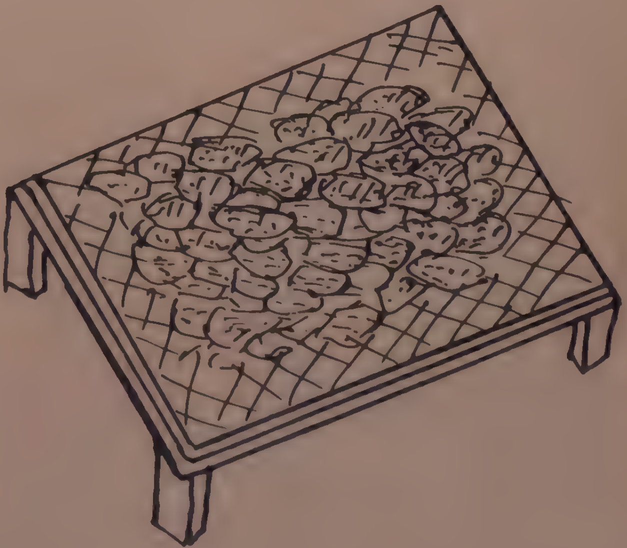


Fig No. 8 :- Sieve away all loose particles and keep in dry place for use.

Micro Hydel : A Technology For the Poor

Fortunately, large dams are not the sole hydro development option of developing nations. The power of falling water can also be harnessed at much smaller sites with capacities between 1 kilowatt and 1 megawatt. By constructing small dams, Third Would countries can unleash the 5 to 10 percent of their hydropower resources that the World Bank conservatively estimates at small sites. Small dams could, in fact, provide roughly as much electricity as Third World countries derive from hydropower today-more, if inexpensive local labour and materials are used.

The economics of building small dams for power production varies widely. The World Bank says that costs hover around $3,500 per kilowatt of installed capacity, but many projects are being built today for between $ 500 and $ 1,000 per kilowatt of available capacity. Because relatively sized engineering and site-preparation costs can be spread over a larger power output, larger dams seem to enjoy considerable economies of scale. But small scale projects look more favourable if the hidden or discounted social costs of large dams are taken into account. In general. developing countries stand to reap more by developing the cheapest small sites available before venturing into additional large dam projects.

Beside generating revenues, small hydro plants can reinforce economic development by converting poorer countries' most abundant and least-used resource-labour-into critically needed capital They can also catch silt-laden storm waters, thus protecting large downstream dams from premature sedimentation.

Among developing countries, China alone has placed high priority on small scale hydro development. While most developing countries have borrowed money and imported technology to build large dams to run heavy industry, the Chinese have relied on indigenous labour, capital, and technology to build tens of tousands of small hydro facilities. Reports that major cities regularly experience "brown-outs" and that electricity for heavy industry is scarce are true, but China has brought many basic amenities to is vast rural population by building small dams.

Although China was an early user of waterwheels, all but fifty of the nation's hydro facilities were decimated in the strife and economic decay that preceded the communist revolution. After 1949 the government followed the that Soviet model of rural electrification by emphasizing large power plants, so the number of small hydro facilities in use actually declined in the late fifties. But with the Cultural Revolution in the mid-sixties came a boom in small-dam construction that China's current leaders continue to promote.

Since 1968 an estimated 90,000 small-scale hydro units with some 6,330megawatts of generating capacity have been built, mainly in the rainy southern half of the country. Although the average size of the units is a meager 72 kilowatts, small plants account for 40 percent of China's installed hydro capacity. In more than one-quarter of the nation's counties, these small dams are already the main sources of electricity, and China expects to add 1,500 megawatts of power annually through 1990 and 2,000 megawatts per year for the ten years following. By the turn of the century, the Government hopes small hydro facilities will be providing six times as much energy as they did in 1979.

The Chinese consider small hydro plants just one part of integrated water management schemes and rural development efforts. Driven by the need to feed and employ a billion people, the government has given highest priority to agricultural water storage, irrigation, flood control, and fishery needs. Chinese villagers have built impoundements and irrigation ditches with simple hand tools and without expensive, heavy earthmoving equipment. Many of the components of hydro plants-turbines, pipes. and gates-have been constructed at small shops by local artisans using local materials and standardized designs. With money earned and saved from agriculture and fishing, communes have upgraded the sites without central government funding Technical advice from agricultural extension workers has improved dam and plant design and helped lower costs.

Unlike dams that power capital-intensive export industries in so many developing countries, small dams in China support workshops that turn locally available raw materials into goods used in nearby areas. Hydropowered factories scattered throughout the countryside husk rice, mill grains, make soap, and produce lather and simple metal goods. The power left over is available for lighting. movies, and telecommunications. While the quantities of energy involved are not great, these hydro plants dramatically improve the quality of rural life-and thus halt migration to overcrowded cities-by reducing the backbreaking drudgery of lifting water, sawing wood, and grinding grain by hand. And village-based reforestation, anti-erosion, and schistosomiasis-control programmes have enabled the chinese to avoid the ecologicol and health problems often connected with hydropowered use. The leaders in Beijing claim that their small-scale water development efforts complement rather than displane the need for large dams. By "walking on both legs" -building small dams as well as large-they hope to exploit fully their tremendous water-power potential without incurring high social and ecological costs.

The projects completed outside China confirm the role of small hydro plant in balanced development. In Papua New Guinea, for example, the village schoolmaster in remote Baindoang heard about hydropower on a radio shop and asked the national university for help in building a small dam. Along with a private group it obliged, and a tiny 7- kilowatt turbine was installed two years later. Celebration and dancing commemorated the coming of power to the village, where it lights both school and store and heats water for communal showers. By mobilizing local labour, the project strengthened the village-level institutions and have provided the villagers a greater sense of control over their own lives- a far cry from what large hydropower projects do.

Spurred by rising oil prices and such examples, many Third World countries have become interested in small-scale hydropower. Nepal, the most active, recently opened about sixty water-powered mills. These efforts are being assisted by modest but growing international aid programmes. The U. S. Agency for International Development has loaned Peru's national power company 9 million for twenty-eight installations ranging in size from 100 to 1,000 kilowatts. France is helping several African nations build small dams, and Swiss groups are helping Nepal set up factories to build small inexpensive turbines. Unfortunately, the World Bank- which between 1976 and 1980 loaned 1.68 billion for large-scale hydroelectric projects has spent almost nothing on developing small sites.

Developing nations themselves also need to reassess the priority they give to large-scale hydrodevelopment efforts. Dotting the countryside with small projects may not be as politically gratifying as erecting a few big modern dams, but it would go farther than a "think big" approach toward meeting in the needs of the rural populace. Although small and large-scale hydro projects go hand in hand, integrated village-level water development should precede the construction of la;ge dams as a general rule. Erosion, the spread of waterborne and other disease, and the side-effects of large projects will be easier to conquer if people have already helped design small dams in their villages. At the same time, rural development will be more balanced and more effective.☼

(The above-written piece is an excerpt from the chapter "Rivers of energy" of the book "Renewable Energy-The Power to Choose" written by DANIEL DEUDNEY & CHRISTOPHER FLAVIN.)

(CHIPKO . . . From Page 13)

management of local resources, it is now finding that the interests of men and women within the same community can differ greatly. As long as the leadership of the Chipko movement remains sensitive to this learning process, the movement is bound to grow in strength. The latest demand to emerge from the women of Chamoli is that it is they who should be elected to the Forest Panchayats and not their men.

Anil Agarwal (S. O. E.)

Earthquakes and Dam Bursts

Dams can also create several hazards which are very significant but not so well-known. Scientific research conducted at several large reservoirs has revealed the possibilities of earthquakes being triggered due to the impounding of massive amounts of water in them. Seismic tremors have been recorded at these reservoirs. Earthquakes can also occur due to the existence of active faults, or discontinuities in the underground rocks, along which movements may take place, or due to the existence of fissures through water seepage into the earth.

In a study entitled, "Reservoirs and Earthquakes," its authors Harsh Gupta and B. K. Rastogi cite about 30 cases, "where the initiation or enhancement of seismic activity has been well evidenced following the impounding of reservoirs behind large dams."

The reality of these hazarads was highlighted after the devastating earthquake which struck Koynanagar, 450 km southeast of Bombay on December 10, 1967. This region had long been a non-seismic one, but had experienced a series of tremors after the impounding of water in the Koyna dam reservoir in 1962. In the 1967 earthquake nearly 200 lives were lost, 1500 people were injured and thousands were rendered homeless. More than 10 percent of rhe houses in Koynagar were either completely destroyed or became uninhabitable. The city of Bombay and its suburbs were also rocked.

(Source : S. O. E.)

State of The World Environment

The United Nations Environment Programme (UNEP) has released a report on the changes (positive or negative) that occurred in the state of the world environment in the decade following the Stockholm Conference in June 1972 on the same subject. The report briefly covers all the major efforts that have been made not only to generate a consciousness on environment and development related issues since the Stockholm Conference and before but also to improve upon our environment.

The report traces the history of 'Environment Movement' where much of the understanding of world environmental systems developed in the 1960's and 1970's. The most significant aspect of the 'Environment Movement' is broadening of the concept of environment to various aspects of natural environment, namely land, water minerals, living organisms and life processes, the atmosphere and climate, the polar ice caps and even space. It also deals with human needs of health, housing, transport, energy and industry and the relationship between the man-made and natural environments.

Though the rate of economic growth in 1970s was slightly lower as compared to 1960s, the pressures of resources particularly oil, forced people to carefully plan their resource use to avoid waste and evaluate environmental component within the total planning process. This is particularly important in the light of the fact that the impact of environmental factors on human activities and productive forces is enormous. UNEP concentrated for the initial years after the Stockholm Conference mostly on the issues concerning impact of diseases whose prevalence depends especially on environmental factors, including chemicals, through acid rains, increase in $CO2$ and reduction in the stratospheric ozone, pollution of ocean and inland waters, soil erosion, salinity, desertification, deforestation, depletion of genetic resources, particularly from the tropical forests, etc also continued to concern environmentalists.

The increase in the concern for environmental bodies can be guessed from the fact that the number of national environmental agencies consistently increased from hardly 10 countries in early 70s to about 60 by the end of the decade. The increase in the number of NGOs has been much more, from about 2500 in 1972 to about 15,000 by 1981. This has resulted in acquiring more detailed statistics on the state of environment in many countries besides imposing national environmental laws. The current framework of environmental analysis centres around man himself which realises that millions still endure squalor, inadequate housing and lack of the most basic services, and the provision of basic food, better health care and improved settlements is barely keeping abreast of growing populations and in some places falling behind them. However, the central message of the world conservation strategy has been realised in the last 10 years as "development cannot be secured without conservation, or conservation without development". ✡

—Narendra Mehrotra

What Is Acid Rain ?

"Acid rain" refers to the deposition of atmospheric pollutants on soils, vegetation, surface waters, or manmade objects that ultimately causes damage or harm because of the acidity of the pollutants. The term "acid rain" is a misnomer in two respects. First, while some of the pollutants may be acidic when deposited, others only become acidic following deposition. Second, the pollutants may be deposited WET or DRY. That is, the pollutants may be carried to ground with rain, snow, or fog (wet deposition) or they may attach to surfaces as a result of atmospheric mixing or gravity. It is important to remember that the term incorporates several pathways to land and water.

The primary sources of acid rain are sulphur dioxide (SO_2) and nitrogen oxides(NOx) These pollutants are frequently referred to as "precursors" of acid rain. SO_2 and NOx are chemically converted into sulphuric and nitric acids, respectively, in the air or on the ground.

Once on the ground or in the water, acid rain begins to have an impact on society. It is the public recognition of the environmental damages that occur at the end of the cycle that has triggered the growth of political pressures to do somthing about acid rain.

(Source : Environment, May 1983)

THE THIRD WAVE

(The following article is based on the chapter 'Gandhi with Satellites' of the Book entitled 'The Third Wave' by the famous author of "Future Shock"– ELVIN TOEFFLER)

In a world of Exploding diversity we shall have to invent scores of innovative strategies and stop looking for models either in the industrial present – or in the pre–industrial post. It is time we began to look at the emergent future.

More than once there have been naive attempts to "develop" a basically First Wave country (meaning : under developed pre-industrial societies) by imposing on it highly incongruous Second Wave (meaning : post–industrial developed societies) forms–mass production, mass media, factory style education, Westminster style parliamentary government, and the nation-state, to name a few-without recognizing that for these to operate successfully, traditional family and marriage customs, religion and role structures would all have to be crushed, the entire culture ripped up by its roots.

By astonishing contrast, Third Wave (meaning : new future scientific) civilization turns out to have many features–decentralized production; appropriate scale, renewable energy de-urbanization, work in the home, high levels of presumption (production cum consumption), to name just a few–that actually resemble those found in First Wave societies. We are seeing something that looks remarkably like a dialectical return.

Given the wider range of options brought by the Third Wave, cannot a people reduce infant mortality and improve life without surrendering its religion or values and necessarily embracing the Western materialim that accompanies the spread of Second Wave or, for that matter, Third from one another, from the urban areas or, from the world at large.

The U. S. and the U. S. S. R. alone use up 25 percent of the available short-wave broadcasting spectrumand a bigger chunk of them are sophisticated parts of the spectrum. This spectrum, however, like the ocean floor and the planet's breathable air, belongs–or should belong–to everyone, not just a few. Thus many of the First Wave countries insist the spectrum is a limited resource and want to be assigned a share of it–even if at the moment they lack the equipment to use it. Given low cost ground stations, computerized kibbutz–size irrigation systems, perhaps even ground sensing devices, and super–cheap computer terminals for village use and cottage industry, it may be posible for First Wave societies to avoid some of the enormous expenditure for heavy transport that the Second Wave nations had to bear. Such ideas no doubt sound utopian today. But the time will soon be on us when they are commonplace.

One can begin to picture a transformation strategy of the development of both low stream, village oriented, capital cheap, rural industries and certain carefully selected high stream technologies with an economy zoned to promote or protect both.

An increasing number of long–range thinkers, social analysts, scholars and scientists believe that just such a transformation is now underway, carrying us towards a radical new synthesis. Gandhi, in short, with Satellites.

□ □

BOOK WATCHING

("The World of Appropriate Technology, A Qnantitative Analysis"; by Nicolas Jequier and Gerard Blac; 210 pages, OECD, Paris, 1983.)

In this Development Centre Study, the authors have attempted to assemble and to analyse all the available statistical information about this new field of activity throughout the world.

More than a few unexpected patterns emerge from the assembled data which tend to conradict a number of long-held assumptions about the AT movement. One concerns the extent of the AT activities of international organisations based in the industrialised countries, which account for almost two-thirds of total world expenditure on AT research, information processing, extension services and other types of work. With respect to research alone, even more striking is the strength of the developing countries : their expenditures are almost as high as those of the industrialised countries and their effort, measured in man-months, is more than twice as in the industrialised countries. Furthermore, governments in the developing countries–not foregn aid programmes–are the main source of funds for AT activities.

On the other hand, whether in industrialised or developing countries, lack of money and bureaucracy–not lack of information–are the major obstacles encountered by AT organisations in diffusing innovations to potential users. Finally, the analysis and mapping of communications networks in AT reveal a greater degree of South–North communication than has been generally assumed as well as a relatively large South–North flow of information and technology.

(This Development Cente Study is on sale at the OECD Publications Office, 2, rue Andre Pascal, 75775 Paris Cedex 16 (tel. 524 81·65). Price : F 75, £ 7 50, S15, DM37).

ENERGY ALERTS by TERI :

(Tata Fnergy Research Institute, 24, Homi Mody street, Bombay–400023)

Biomass Energy :

Biomass Use for the self-Reliant Development of Third World Rural Communities : reports the assessment of 'Self–reliant development' prorgamme in a village in South India and in 2 Nepalese villages by using a systems modelling technique.

(Lewis, C. W. and others; Energy from Biomass; 2 nd E. C. Conference; Sept· 1982; 766–70; 5 pgs.)

Small Steam Pump for Irrigation in the Third World : Describes a small steam pump, designed to irrigate small farms of approximately 3 hectares. It will acept a very wide range of biomass fuels with little or no modification and in most circumstances will be at least economically competitive with diesel pumping.

(Hislop; D. W. and others; Energy from Biomass; 2nd E. C. Conference Sept. 1982; 761-65; 5 Pgs.)

State-of-the-Art of Small Producer Gas Engine Systems: This paper focuses on the present status of small gas producer engine systems for use in developing countries. The main objective was to gather reliable information about the past and present work in the field. About 1200 documents were found of which about 600 were reviewed and various institutions and people contacted for information. From the above work the author concludes that no wides pread use of gas producers will occur in the near future.

(Knapp; A. Energy from Biomass; 2nd E. C. conference; Sept. 1982; 715-19; 5 pgs.) □ □

RENEWABLE ENERGY NEWS

1) Global Renewable Energy Scenario : Recent developments in technology have advanced many renewable, non-conventional sources of energy from frontiers of research and development to the small-scale commercial deployment stage. The exploitable potential of some of the resources is as follows :

Solar Energy : The earth receives some 178,000 tera watt year (Twyr) per year (5·4 million quads solar energy per year). Realistic exploitable potential is put at some 9.6 Twyr/ year (290 quads/year) by 2030.

Geothermal Energy : Geothermal energy harnesses the internal heat of the earth in the form of hot water or steam to generate electricity and is currently used for space heating, hot water supply, and electric power generation. Its estimated potential is 35 Twyr/ year (1000 quads/year).

Tidal Power : Estimated potential 3 Twyr / year (90 quads/year)

Biomass : Biomass is considered a very useful source of energy not only in the developing countries but also in the developed ones. For instance, about 15 per cent of UK's current primary energy needs can be met from biomass-half of it by 2000. **(WORLD SCIENCE NEWS, 10-17th Aug. 83)**

2) India's First Solar Village : Choglamsar nestling in the Himalayas at 4,000 metres above sea level in the desert region of Ladakh, is the country's first solar village. Since solar energy was introduced in the village in 1980, all on-going constructions are equipped with solar devices to keep the rooms warm in temperatures touching minus 30 degress Centigrade. A UNI correspondent who visited the solar village on the banks of river Sindh, saw a 500 watt solar generator. A solar water pump, installed by the Public Works Department, and a solar cooker were also functioning. Choglamsar, a Tibetan village boasts of the unique distinction of being the world's second solar village, the first being in the United States. The cost of heating a house with solar energy is about Rs. 3,000.

(HINDUSTAN TIMES Sept. 1, 1983)

3) Rajasthan's Biggest Community Biogas Plant : With 85 cubic metre capacity, this largest community gobargas plant commissioned at Lalpura village in Jaipur, has changed the complexion of the village by providing cooking gas and power both. A generator attached to the plant provides electicity for street and domestic lighting.

(STATESMAN, Sept. 1)

4) Nabard For Quick Loans To Biogas Units : The National Bank for Agriculture and Rural Development (NABARD) has asked all bank and financial institutions to expedite clearance of loan applications for biogas plants to ensure that at least 75,000 such plants start functioning before March, 84. The credit institutions have to ensure that construction work on new biogas plants commences immediately after the monsoon.

(FINANCIAL EXPRESS Sept. 2)

5) Smoke Based Solar Collectors : An advanced solar collector, called small Particle Heat Exchange Receiver (SPHER), which uses smoke to absorb solar energy has been developed at Lawrence Berkeley Laboratory, USA.

The smoke is a low concentration of carbon particles generated by pyrolysis of acetylene to produce carbon black. The submicron carbon particles and air are pumped through SPHER at a rate of 100 cubic feet per minute. The carbon particles quickly absorb concentrated solar energy heating the air steam above 1380 degree Fehrenheit, which expands to drive the turbine of an electric generator. the particles themselves turn into carbon dioxide.

(RESEARCH & INDUSTRY, Vol. 28, June 1983)

points to ponder

Anti-pollution Rules Flouted : The Maharashtra pollution control board complaints against 90 industries in various courts for contravention of the provisions of the pollution control Act and notices have been served on 415 industries, warning them of prosecution, if pollution control measures were not adopted. The 12-year-old pollution control board in the state has identified 6,000 estaplishments as major polluting industries which accounted for 85 percent of effluent pollution in the state. Of these, over 2,000 industries have undertaken pollution control measues either fully or pratially.

Nearly 330 milion litres of untreated domestic sewage and 21 million litres of industrial effluents were daily released in the Mahim creek. The daily release of air pollutants in Bombay has been estimated at 1,500 tonnes. Out of an estimated 200 million tonnes of solid wastes generated in the country every year, Bombay city alone accounted for about 11 million tonnes. (**TIMES OF INDIA Aug. 30**)

The Beginning of the End : The Age of Ecology began on the desert outside Almagordo, New Mexico, on the desert outside Almagordo, New Mexico, on July 16, 1945 with a dazzling fireball of light and swelling mushroom cloud of radioactive gases. As that first nuclear fission bomb went off and the colour of the early morning sky changed abruptly from pale blue to blinding white, physicist and project leader J. Robert Oppenheimer felt at first a surge of elated reverence; then a somber phrase from the Bhagvad-Gita flashed into his mind. "I am to become death, the shatterer of words." Four years later, although Oppenheimer could still describe the making of the atomic bomb as "technically sweet", his worry about the consequences of that achievement had increased. Other atomic scientists, including Albert Einstein, Hans Bethe, and Leo Szilard, became even more anxiously determined to control this awesome weapon their work had made possible– a reaction eventually shared by many ordinary Americans, Japanese and other peoples. For the first time in some two million years of history, there existed a force capable of destroying the entire fabric of life on the planet. (**'MANAS'; Los Angeles**)

Acid Rain over China : Officials in Chongquin, People's Republic of China monitored the pH of the city's rainfall during 1981–82 and found it ranged from 4·64 to below 4. A pH below 5·6 is considered to be acid rain; a pH of 3 reveals acidity similar to vinegar. Monitoring done in 25 provinces, cities and autonomous regions by Chinese environmental protection personnel show 88% of the area are plagued with acid deposition. (**INTERNATIONAL WATER REPORT, July /Aug. 1983**)

Excess Flouride Harms Teeth : An excessive intake of fluoride through drinking water can lead to fluorosis, a serious condition in which teeth and bones become brittle and susceptible to fracture. Fluorosis has been observed in a large segment of the population of Kenya where drinking water contains high concentrations of fluoride and constitutes an important public health problem. But the exact relationship between fluoride intake and fluorosis is not clear. Support from Canada's International Development Research Center will unable the University of Nairobi to conduct experiments on defluoridation as a major preventive measure.

Poly–Aluminium chloride and alum, two chemicals commonly used in water treatment plants, will be tested as possible coagulants. Other materials, such as clay, carbonized coffee husks and bone meal will also be evaluated for their effectiveness in removing fluoride.

(IDRC FEATURE) □ □

COMING EVENTS

1) NATIONAL SOLAR ENERGY CONVENTION

The Solar Energy Society of India will be holding its Annual Convention at Baroda, on December 11th -17th, 1983 at the General Education Auditorium of the M. S. University of Baroda. The Convention will be preceded by a works-shop on 'Solar systems design' for young professionals and it will be followed by specially arranged tours of solar system installations in the State.

Solar Energy and various other renewable sources like wind energy, bio-mass, etc; are receiving increasing attention from the Central Government as well as a number of State Governments.

The convention is likely to be used for stock taking so that future direction could be more clearly defined. More than 400 delegates from all over the country and some foreign experts are expected to attend this convention and panel discussions by experts are being organised to focus the attention on relevant issues. An exhibition open to general public is also being organised in addition to various audio visual shows.

With a large number of organisations laking a very active role, the coming convention is likely to establish Baroda as the 'Solar City of India'.

2. NATIONAL WORKSHOP ON S.T.&D.

,A National Workshop on Science, Technology & Development in the rural context is being planned at the time of Indian Science Congress being held at Ranohi from 3rd to 8th January, 1984. This Workshop is proposed to be held at Bishunpur (near Ranohi) and to be hosted by Vikas Bharati, Bishunpur 83533- a S & T Field agency devoted to intergrated development in a tribal region. Following are some important details :

1. Theme : "National Workshop on 'Science, Technology and Development in the Rural Context".

2. Dates : 8th. , 9th. & 10th, January, 1984. Indian Science Congress Session on 3-8 Jan. '84

3. Venue : Bishunpur (125 Kms away from Ranohi in Bihar)

4. Objectives :
   - (a) Interaction among field-agencies, research Laboratories and other academic institutions; govt. Officials and the target -groups regarding various aspects of planning -process and technology-frame.
   - (b) Involvement of young scientists & engineers in the development process.
   - (c) To help build up some core-group for Appropriate Technology Movement in country, particularly in the stern and Central Region.'

CSV BIOGAS PROGRAMME

The Centre of Science for Villages (CSV) would be conducting training courses in Janata (fixed dome) biogas plant construction under the purview of the National Project for Biogas Development. The Rural development Department, Maharashtra Government, has allotted Wardha, Gadchiroli and Akola as the three districts where these training camps would be conducted during November or December of this year. The total number of masons invited for each of the three camps is 20 and the emphasis, naturally is on training the rural and not the urban artisans. The total duration of the camp is 21- with 19 days for field training and two for Theory. The Centre has installed 250 biogs (Janata) plants during the year 1982-83 with a target of 1300 more installations during the year 1983-84.

Karla Survey

(.....contd from page 8)

CONCLUSIONS

Following conclusions are drawn from the survey :

1. a) 30% of the population does not use fire wood at all. They use agricultural waste materials only. 70% of the population uses firewood along with agricultural waste materials.
   b) Out of the 70% population which uses firewood along with the agricultural waste materials 48% population utilises fire wood as main fuel and 52% uses it as supplementary fuel.
2. a) Fuel need of a family in which average family members are five and which uses firewood as well as cotton stalks, "Tur" stalks and cowdung cakes is 4.3 Kg. Cotton stalks and 2.4 kg. fire wood.
   b) The 30% families which exclusively use cotton stalks and other agricultural wastes require 6.9 Kg. cotton stalks per day for a family of five members.
3. For satisfying the needs of a family they have to spend on an average 2 hrs. 30 minutes time daily or 17.5 hrs. per week.
4. Firewood is mainly used by medium farmers for cooking.
5. Collection of fuel is mostly done by women in a family (77.2 per cent). They carry it on their head and have to walk approximately 1.1 to 2 km. with load on their head. Men (22.5%) bring the fuel by bullock carts.
6. Almost all people (100%) utilise cotton stalks and 'Tur' stalks (Cajanus cajancates)and cowdung for cooking and heating water.
7. Almost all famlies appreciate the idea of the plantation of the fast growing trees near their houses but more than 60% people do not possess that much land around their houses.
8. In rural areas money is not spent on fuel. ■

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Cover pages printed on Hand Made Paper : Prited and Published by Devendra Kumar on behalf of Science fo villages, Wardha, Editor : Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha-442001. Printed at Samyayog Printing Press, Wardha. Regd. No. WDA-119

SCIENCE FOR VILLAGES

Building a Bridge between the Science Lab and the Village Mudhut

C.F.T.R.I. MYSORE

.VII No. 1 Oct-1983, Monthly Annual Subscription Rs. 15/- (10 Dollars) Individual and Institution Rs 25/- 15 Dollars)

Why An Experiment In Gandhian District ?

The crucial riddle that planners of the country are not able to give an answer is that despite great success in the implementation of plans in the field of productivity in mineral exploitation, energy expansion, industrialization, irrigation agriculture and creating a better infrastructure for growth, the nation has to hide its head in shame for being regarded the biggest poor and poorest big country of the world standing amongst the last ten countries in per capita income. Unfortunately, despite green revolution and industrial growth the number of people below poverty line remains much the same. The assumption that increases in production at whatever level of the system, will ultimately percolate down to the lower strata has proved wrong not only in India but everywhere as well. There seems to be an imperviousness prevailing in the successive strata which become progressively hurdlesome. Thus we find our efforts on the distributive justice front not very impressive as per the following figures :-

World Development Report 1980, p.159; Table 24 gives the data, relating to 64-65, on income distribution in India says that the lowest 82% of households have 6·7% share while the highest 20% account for 50% of the household income. And India's Draft Five Year Plan 1978-83 says on page 3 that the 20% households having Rs. 1,000 or less of assets account for less than one percent of all rural assets while 4% households with assets of Rs. 50,000 or more own over 30% of the total rural asset. The cruel fact remains that the disparity prevailing in India is rated as the highest amongst all the five countries of the Indian sub-continent.

It was no doubt on these considerations that in 1975-76 the Government of India at the Prime Minister's behest decided to choose one district in each State under what was named as 'Intensive Rural Development Scheme'. Here, innovative efforts were to be made for the above purpose so that new modes and models could be found out as to how the poor and deprived of the land could be brought to the level of subsistence. The forum of Indian Science Congress was rightly chosen to present this challenge to the scientific community of India in 1976 and later the parliament approved of the same. Later 19-20 districts were chosen for such an endeavour, Wardha being one of them. But with the change in the government within a year of the formulation of this policy, the experiment got diluted and ultimately shelved. There was a great intuitive key to remove poverty so that the results obtained in them could be later applied in all districts and the models thrown up in the endeavour incorporated in the national policy. The other very basic idea of I. R. D. was to involve science and technology in the service of villages. Science & Technology continue to help greater production; but sophistication of new scientific application tends to take it out of the reach of the poor countries and people. The capital intensive technology help differentially the strong at the cost of the weak - both on global as well as national level. Here production increase through the traditional world-wide accepted model creates disparities. Therefore, a new methodology of science serving the ideology of social justice is to be found. The new strategy has to result in not only immediate gains but also to consider the long-range environmental and ecological effects on our and coming generation. All these New directions of approach need to be tried out all over the country

(Contd on page 14...)

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Water proofing of small irrigation channels :

In India, farmers depend mainly on open earthern channels for conveying water for irrigation from a main canal point to their fields. Considerable quantity of water is lost during passage through the channels due to seepage on the way. In the predominantly sandy soils, some times, the seepage is so much that it becomes difficult to convey the water even over short distances. The Central Road Research Institute, New Delhi developed a simple method for water proofing of irrigation channels. The technique consists of applying an intimate mixture of mud plaster and a small quantity of the bituminous material in a thickness of about 0·5 inches over the sides and bottom of the channel and allowing the plaster to dry. The steps involed are: removal of vegetation, construction of embankment, trenching the channel, treatment for preventing weed growth, preparation of plaster, plastering the surface, smooth finishing and leaving to dry. Any damages caused by rats or animals can be repaired by plugging the damaged portion with the same plaster. The treatment is expected to last 4 to 8 years.

Power pack for cycle rickshaw :

To overcome the disadvantages of the ordinary cycle rickshaw, the Central Mechanical Engineering Research Institute, Durgapur has developed a suitable power-pack, which is mounted on the ordinary cycle rickshaw after incorporation certain modifications. Some of the salient features of the powered cycle rickshaw are that, (a) it can carry two passengers without pedalling assistance by the driver (b) it can negotiate all gradients generally encountered in different roads (c) it can travel 45 km/litre of petrol-oil mixture (d) it can attain a top speed of about 30 km/hour and can come to a standstill from this speed within a distance of 8m; (e) the driver himself can attend to the routine maintenance.

Home made solar cooker :

Mr. Bhim Sen Bhola of New Delhi has developed a solar cooker which costs only about Rs. 120/- and can cook porridge, pulses, gram, rice, khir, potatoes, carrots, etc in 2–3 hours in summer and 3-4 hours in winter, depending on the intensity of solar radiation. The cooker consists of a wooden box with inside dimensions 63.5 cm × 63·5 cm × 17·8 cm and a tray-like aluminium box of dimensions 43cm × 93 cm × 12·7 cm. The inside of the aluminium tray is painted black. Foods to be cooked are placed in aluminium untensils of 20 cm diameter and 7.5 cm height, painted black on all sides including the bottom and lid which are then put inside the box and placed in the sun.

For further detailed information please contact Mr. Bhola, Rtd. Dy. Director (DES & D), at J-9/2, Rajouri Gardens, New Delhi-110 027.

Novel underground solar water heater :

Present the Performance of a novel solar water heater which consists of a rectangular tank (110×80×10cm) made up of G. I. sheet and is provided with inlet and outlet pipes. The tank is buried underground; the top surface of the ground is blackened and glazed so that the surface acts as an absorber of solar radiation while the tank as well as the surrounding earth serves as the storage system. During off-sun shine hours the top surface is covered by a layer of insultion so as to prevent upward loss. An analytical model has been presented to predict the performance of such a system. Centre of Energy Studies, Indian Institute of Technology, Hauz Khas, New Delhi-110 016).

World Movement of 'Science for People'

(Conclusions of the non-governmental Organaizations Meet in Rome on 28–30 March to discuss UNCSTD programme implementation.)

The United Nations, by virtue of the agreement reached by participating Governments at the 1979 UN Conference on Science and Technology for Development (UNCSTD), is given the tremendous and challenging task of implementing the Vienna Programme of Action and this task is focussed on the "mobilization of science and technology for development to ensure that application would lead to a constant increase in the well-being of the entire population on the basis of its full participation in the process of development." We belive that most non-governmental organisations (NGOs) are prepared to contribute to this task

Many NGOs are in fact already doing so in a wide variety of ways. These range from disseminating information to developing countries through the thousands of scientific and technological publications is used and meetings held each year end by increasing the scientific and technological competence of persons from these countries through workshops, conferences, and formal courses of study, to working directly with the urban and rural poor in all countries to better the quality of their daily lives through the application of new and improved technologies.

We belive that NGOs could do much more if they were given the opportunity. Furthermore, because of their informal methods of working, NGOs could do so in a highly cost-effective manner, stretching much further the desperately limited resources provided by Governments to the UN system or used directly in implementing the Vienna Programme of Action.

Science and technology can help, but only if accompanied by institutional changes that enable the people to participate fully in making critical choices affecting their own lives. Moreover, the application of science and technology should focus on a sustainable development process. Only in this manner, can the Vienna programme of Action's "ultimate goal of science and technology to improve the well-being of humanity as a whole" be realized.

In order to enhance the contribution of NGOs in achieving the goals of the Vienna programme of Action, it is decided that a continuing process be initiated to strengthen their involvement. To this end, it is decided to establish a follow-up mechanism, to maintain liaison between NGOs and the Intergovernmental Committee on Science and Technology for Development and the UN Centre for Science and Technology for Development; and to facilitate communication and cooperatiom among NGOs active in the field of science and technology for development.

Because NGOs concerned with science and technology are highly diverse and geographically dispersed, the task of establishing a follow-up mechanism will require substantial effort.

Specific Tasks for NGOs in implementing the Vinna Programme of Action

NGOs working at the national level should participate actively, in dialogue with their Governments, in the fotmulation of the goals, priorities, and means of implementing policies for science and technology for development. To this end, the UN system should encourage this dialogue, through seminars and working groups on science and technolgy for development, organized at the national and regional levels, and involving NGOs and Governmental focal points,

points to ponder

Production & Disparity: More than on small owners the green revolution would have had a negative effect on tenant farmers and sharecroppers In the Funjab, for example, where manpower is in short supply, the increase in the number of landless, and a growth of mechanization and productivity·

The direct impact of a technology that raises production per ha. in a country where the distribution of land is extremely unequal is to accentuate simultaneously the inequality of family revenues. Likewise a technology that is not appropriate to irrigated lands or those well watered by regular rains cannot but aggravate regional disparities. The growth has been in the production of irrigated wheat, and that the rate of total growth of grain production does not reflect the boom in cultivation of wheat, which is cultivated only in some regions. The performance of rice was well below that of wheat for various reasons.

Even if, at the beginning of 1983, India is self-sufficient in wheat, half the agricultural population lives below the poverty line and the yields of irrigated lands are 1·6 for maize.

The problem facing Indian planners is therefore one of combining production growth with equity to raise the standard of living of the poorest while making them more productive. In other words, it is a question of organizing agriculture in such a way that the greatest possible number of farmers can participate in the green revolution and to distribute the lands in such a way that the over-abundant population of landless peasants and marginal owners can find non-agricultural part-time, or even full-time work.

(from 'Ceres', Nov/Dec'82)

Whither Education : The Director General of UNESCO called on the community to help fulfill individuals, to assist them in gaining capabilities to find their own solutions and to do away with a hierarchy which promotes exploitation through the school system Andre Henry, a French educational minister said Popular Education, which is what we are concerned with here, has been marginalized, stifled and sterilized for decades. Inspite of some progress we are still dealing with a society characterized by inequalities and elitism. It is, therfore time for each person to consider himself responsible, cease to be an object submitting to decision in which he or she has not participated and fully to take on the dignity occuring to the free and conscions citizen."

('Second Thoughts', March 83)

Collosal Waste of Food: The world's food supply could be increased from 10–30 percent without any increase in producation, if only the amount of food wasted in processing and storage could be reduced. Estimates of the amount of food lost between harvest and table in some tropical countries, where heat and humidity are combined with lack of proper facilities as major causes of spoilage. run as high as 60 percent.

There are 90million people in the developing world who cannot get enough firewood to cook their meals, according to the UN Food and Agricultural Organization. By the year 2000. about 140 million will be suffering such shortages.

The Drugged Third World : Do you know that the per capita consumption of drug as percentage of G. N P. in developing countries is even more than the developed nations The respective figures are 0·2 to 0·7% in rich and 0·92 in poor countries. Thanks to the drug trade.

Hello ? Hello ? : Of the 3,500 million people in Asia, Africa and South and Central America, 1000 million live in cities with some from of tele-communication facilities. They can at least reach a telephone nearby. But 2,500 millions living in the rural areas of these continents lack every form of telecommunication. This means that 55 percent of the world population can telecommunicate only if they displace themselves over great distances.

(World Science News, 3rd Aug' 83)

WINDOW TO THE WORLD

part of a world-wide movement of A. T. Here is an account of the ideas and activitise of the birds 'of the same feathers from overseas.

Coated Seeds For Rich Harvest :-

A rich harvest can be obtained annually even if the field is sown once every few years with the seeds coated in special capsules sensitive to high frequency electric current.

According to the new method evolved by Soviet scientists, coated seeds are sown and in the spring only part of them are activated by an electric pulse with the help of a conventional irrigation machine. By doing that only the activated seeds germinate this year and the next spring, the electric pluse activates another portion of incapsulated seeds The procedure is repeated several times for a number of years. Now, a corn field needs no ploughing, no harrowing, no fertilizing, no sowing and yet at harvest time it yields plenty of wheat, rye, barley or other grain.

(World Science News)

Water Divining :-

For the past year a diviner's teachnique, used in Europe and the U. S. A. by the water companies to find 'lost' pipes has been used by community council animators who have undergone training at the Ateliers/Ecoles in Camp Perrin.

This technique, which assumes that one is 'Sensitive' (seven out of ten people are) requires nothing more than two steel rods which. by their movement, indicate the point under which water is located. They also indicate two other points whose distances from the central point allow for the easy calculation of the depth of the water table.

This simple and sure technique (100% sucess in one year) allows for the approximate estimation of construction costs and optimum placement of the well to coincide with the charcteristies of the existing water table. (9TIH Bulletin, Haiti)

'Abnormal' Frogs Indicate Pollution :-

An Australian scientist believes frogs may be one of the most important and sensitive early warning systems fot environmental pollution. The highest form of animal life which lays unprotected eggs in fresh water, frogs develop abnormalities due to pollution at concentrations far below the fatal level. Mr. Michael Tyler, a senior lecturer at the university of Adelaide, and an authority on frogs, is studying the relationship between environmental disturbance by pollution and the incidence of skeletal abnormalities in frogs. (Telegraph 6 Sept. 83)

Health Food From Tobacco ? :

Tobacco could become an important source of health food and provide badly needed protein for people in less deveoped countries according to researchers at the University of Florida. Tobacco protein is a white, crystalline powder which looks much like talcum powder. Mr. Ed White, co-researcher said, "It is a taste-less and odourless and when added to food takes on its properties" "It is a complete protein in terms of aminoacids. Which are essential nutrients-it exceeds the United Nations Food and Agricultural Organisation (FAO) requirements for protein quality for human nutrition" Mr. Rich said.

(The Hindu, May 2' 1983)

Furnace Fuel From Sugar :-

A machine which can process waste from sugar cane mills to produce a furnace fuel is in the final stage of development at the University of Queensland, Brisbane, Australia. The prototype of the new machine includes four crucifrom concave rollers which roughly shape and slightly compress the bagasse as it is fed in through a chute. The bagasse passes from the rollers into a hollow steel cylinder in which it is heated and compressed by an hydraulic ram exerting a pressure of 36 MPa (about 5200 psi)

The process has produced experimentally a hard cylindpical briquette about 76 mm (3in) in diameter, varying in final density and durability according to particle size, temperature used and moisture content. If the process is found to be viable it is planned to use a shredding machine to disintegrate the briquette for feeding into furnaces as fine combustible particles. Experiments had shown that the bagasse could be reduced to a fifth of its volume by compression and heating.

(World Science News)

WOOD SAVING EFFICIENCY HIGH CHULHAS INDIA

Name & Source	Description	Fuel used
1. Moradabad Chulha National Building Organization (NBO) Regional Housing Centre 11-A, Janpath, New Delhi	4 pot, mud stove with chimney	Wood, Cumbustible Waste
2. Herl Chulha Hyderabad Engineering Research Laboratories Hyderabad (A P.)	4 pot, mud stove with chimney and rotating damper	Wood
3. Portable Magan Chulha Gandhi Niketan Ashram Kallupatti, Madurai, Tamil Nadu	3 pot, ceramic stove with chimney, baffles and grate	Wood and charcoal
4. Bhavanagar stove Planning Research & Action Institute (PRAI) State Planning Institute Kalakankar House, Lucknow (U. P.)	2 pot fixed brick and metal stove, rotating damper, butter-fly value chimney and grates	Soft Coke
5. Army H. Q Type PRAI, Lucknow	2 pot, brick and metal stove. It has a metal grater, metal cover plate, 20 Lt. water tank and a metal chimney	Soft Coke
6 Banerjee Type stove PRAI, Lucknow	2 pot, brick work and steel stove, has grate, air damper fuse gas damper and a hot water tank	Soft Cock
7. PRAI Improved Chulha NBO, New Delhi	2 pot, mud stove, has a chimney, a metal sheet damper	Wood, Straw
8. Karai stove PRAI, Lucknow	2 pot, mud and metal stove, with a chimney and a 40 Lt water tank.	Wood
9. I. P. A. Stove Indian Institute of Technology, Kharagpur, West Bengal	2 pot, stove built in mud ceramic and steel has a chimney and a grate sheet steel hopper	Rice husk

IMPROVED STOVES FROM OTHER COUNTRIES

Name & Source	Description	Fuel Used
1. New Keren International Technology Development Group 9 King Street, London – WC 2 E BHN.	1 pot ceramic stove with grate and provision of secondary air in the walls and in the walls of the Combustion Chamber.	Wood
2. Kamoda Cooker Georgia Institute of Technology, Atlanta.	1 pot, portable ceramic stove with a damper for combustion gases and a damper for combustion air, a metal grate. By closing the top cover it can be used as oven.	Wood Charcoal
3. De Lepeleire I Eindhoven University of Technology, Postbus 513 5600 MB, Eindhoven The Netherlands	1 pot portable metal stove with a grate	Short wood
4. Tungku Sac (Indonesia) ITDG, London	2 pot, portable ceramic stove, a grate and holes in the combustion chamber for secondary air	Wood Agricultural Waste, Corn Stalks Straw
5 Louga stove Volunteers in Technical Assistance (VITA) 3706 Rhode Island Avenue MA Rainier, Maryland 20822 U. S. A.	1 pot, fixed mud stove with an inlet air damper. The pot fits inside the stove.	Wood
6. Poil Type Stove (Java) TOOL, P. O. Box 525, EINDHOVEN The Netherlands	1 pot fired ceramic stove. The rice husks are pressed into the stove while leaving open the Central hole and the draught hole, the stove is lighted at the bottom of the Central hole (Saw dust stove – type)	Rice husk
7. Da Silva Charcoal stove (Ceylone) Institute of Scientific & Industrial Research, Colombo, Sri Lanka.	1 pot, portable ceramic bucket shaped stove with a grater in the middle.	Charcoal
8. Bandung Ceramic stove Food and Agriculture Organisation, Via delle Terme die Curaculla, 00100, Rome, Italy.	1 pot, portable ceramic stove with a damper and a grate	Charcoal
9. Tandoor stove, ITDG, London	2 pot, ceramic stove, with a damper and grate, it can function as an oven	Wood, Charcoal
10. Micutta Tiko 2 SKAT, ST, Gallen, Geneva	1 pot, portable metal stove with a chimney and a baffle.	Wood

MAGAN CHULHA

Description : Magan Chulha is a smokeless wood fuel oven which relieves women of eye-diseaes and headaches caused due to heavy smoke in the kitchen. It saves 30-40% of the fuel used in a conventional three stone chulha.

Materials : Clay, cowdung, horse-dung, straw cuttings, ash or sand, fire clay chimney, pipes, grating and dampers.

Construction : Magan Chulha is basically a mud stove fixed with a metallic grate a damper and optional metal collars on pot holes. It accommodates three special pots of 22 mm. diameter. Has a fire place for long wood and a grate for charcoal. Has a chimney, a flue gas damper, a grate in the fire place. Proper admixture of clay, sand, horse-dung etc. is made to stabilise the soil/mud and after due moistening and maturing a block of 762 mm. X 586 mm X 212 mm. is made and allowed to achieve a semi dry state. As per the figures the pot holes are marked and the tunnel scooped out.

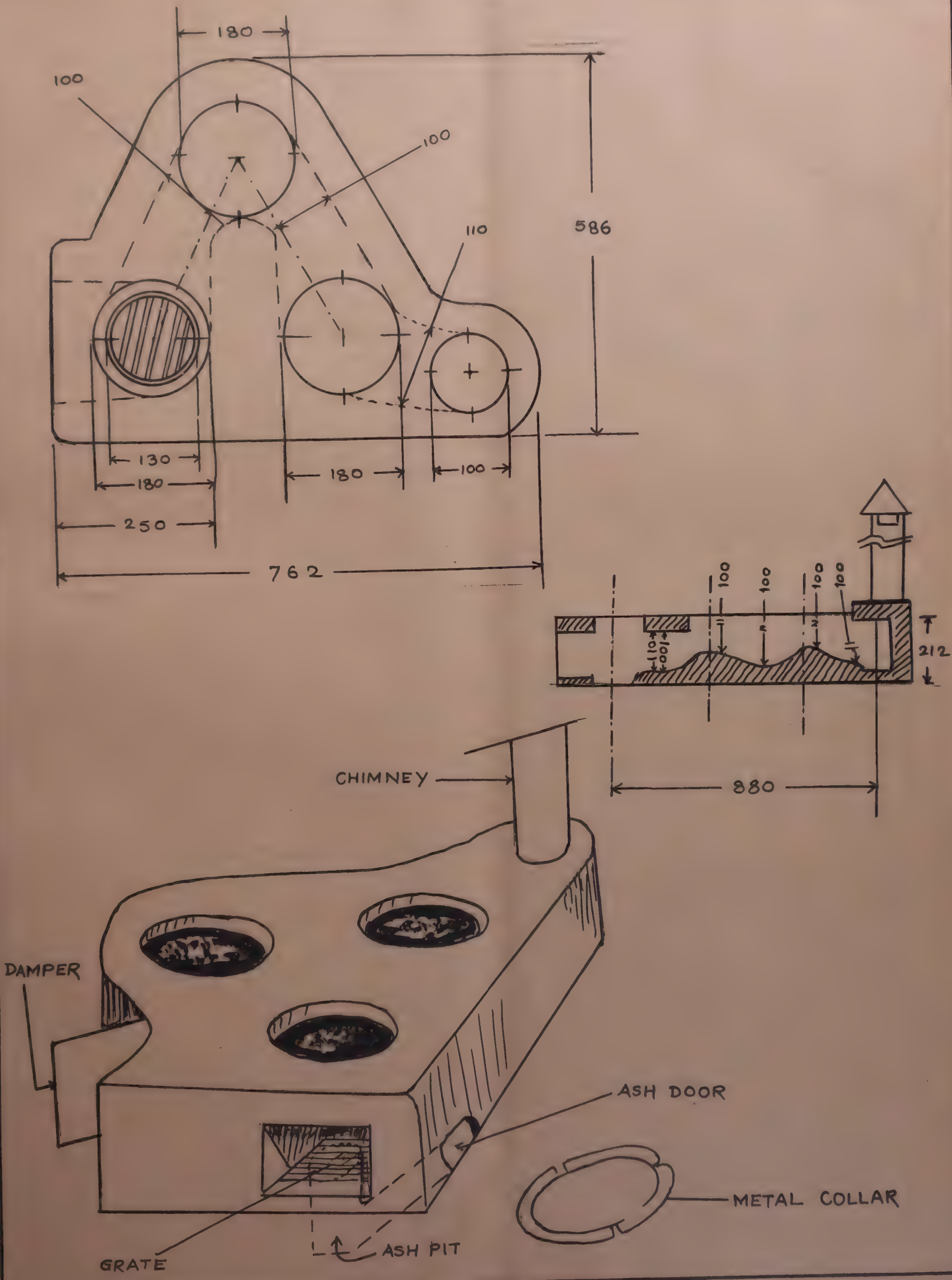
Process : Once the chulha is lighted, the hot air goes up the chimney which is replaced by incoming cool air, thus creating a continuous draft to keep the chulha burning. A damper is used between the first and second pot hole to check the flame rushing into the second pot chamber without heating the first pot properly. The heat flow is controlled by sliding the damper back and forth.

The flue channel is a long zig-zag tunnel to retain the heat for a longer period. There is a metal grating below the first pot to create proper draft and allow the ash to fall down in a shallow pit below the grate. An ash door (see diagram) is built on the side of the chulha to clear up the ash from time to time, as well as provide draught from below the grate.

Approximate Price Range: Rs. 20 to Rs. 35

Source:

Magan Sangrahalaya Samiti
Wardha-442001 (Maharashtra
INDIA


CHIMNEY
DAMPER
ASH DOOR
METAL COLLAR
GRATE
ASH PIT

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no doubt, but to be specially experimented upon in selected areas, for throwing up ideas as well as to generate confidence in the micro scale, so that it can be applied on the macro scale concept of Gandhi district.

When thu 6th Plan was on the ar[illegible]d all sections of opinions were being solicited by the Planning Commission, an important fact was brought in relief that the infra-structural support to general increase in productivity does not necessarily help remove proverty. For reaching the poor, specifically target group oriented time-bound plans are required to be made. At some stage the Planning Commission took congnizance of the idea mooted out by Acharya Vinoba I have that the district of Wardha (where Gandhiji himself spent many of his years) be chosen for such an experimentation and he gave the name of such a move-of a district being developed on Gandhin lines as Gandhi Zilla Scheme The then Union Minister of Planning Shri N. D Tiwari, met Vinoba on 30 th of January 1981 and discussed this proposal with him as well as with official and non official people working in the development field at Wardha. The proposal took further shape and substance when the Prime Minister approved of it and the Planning Commission asked Dr. M. S. Swaminathan Committee to prepare a plan for this.

Devendra Kumar

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Please write to : The Editor, Science for Villages, Magan Sangrahalaya, Wardha-442001. (M.S.), INDIA.

Cover page printed on Head Made Paper Printed and Published by Devendra Kvmar on behalf of Science for Villages, Wardha, Editor : Devendra Kumar Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, 442001, Printed at Samyayog Press Wardha. Regd. No. WDA-119

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SCIENCE FOR VILLAGES

lding a Bridge between the Science Lab and the Village Mudh

VII No. 2 Nov. 1983, Monthly Annual Subscription Rs. 15/- (10 Dollars) Individual and Institution- Rs. 25/- (15 Dollars).

Science & Development : Whither UNiCSTD

The United Nations Conference on Science and Technology for Development held in 1969 at Vienna was a landmark in the history of application of Science. Herein all the nations of the world sent their representatives to deliberate upon the direction which Science & Technology (S & T) should take, for the good of the global family. The Conference also brought forth the impassioned plea of the developing nations on less developed countries (LDCs) that theyshould get their proper share in S & T from the affluent and more developed countries. To do this LDCs demanded a world fund which could help them to acquire S & T for giving them economic balance in the competetive world and not allow them to continue being dependent on and thus being exploited by the developed countries (DCs). There was a tussle between the haves and have-nots in regard to the quantum and modes of sharing S & T but ultimately many pious resolutions were passed.

This year in March in Rome a review meeting was held of tne UNCSTD and it was found that the progress envisaged of 'one-world' in S & T has not been much. The more developed nations continue to race forth with seven league boots while the weaker nations slag along at snail's pace and naturally the distance between the two increases with time in a geometric proportion as the S. & T. progressively develops in the developed. nations. There are in fact three dangers in the present trend of competitive S & T race apart from its ever increasing use in producing instruments of destruction which threaten the very existence of the human race :

(i) S & T makes the disparity between the affluent and the Third World greater and greater as the exploitative power of the former increases.

(ii) The ecological balancer and non-renewable resources of earth get disturbed, depleted and exhausted without let or hindrance.

(iii) The conception of 'development' remains the increase of the GNP of the nation and its favourable balance of trade and not improvement of life of the common people-the people below the line of subsistence- whose fate much remains the same.

The UNCSTD had in 1979 focussed its attention on "mobilization of S & T for development" to ensure that (its) application. . would lead to a constant increase in the well being of entire population on the basis of its full **participation** in the process of development, but this aspect was not given much importance. What has happened is well described by Mr. Ponna Wignaraja, Secretary General of the Society of International Development, Rome. He says the development process in the past quarter century assumed that there were "developed" countries and "developing" countries and that if the experience of the former, along with some resources, were transferred to the latter the gap would be narrowed. The objectives and processes were viewed in economic terms and great reliance was placed on economic factors to achieve results. The framework assumed that rapid economic growth could take place with emphasis on industrialization, modernization and urbanization. Capital, the factor in short supply and modern technology available in industrialized countries were viewed as the main input into the process. Internal capital accumulation would be assisted by inflows of foreign capital and technology. The cumulative benefits of this kind of growth in the modern sector were expected eventually either to "trickle down" automatically or, at best, be handed down in an administrative fashion or "delivered" to the large numbers who in Third World countries live predominantly in the rural areas. Material accumulation was expected to solve other human problems. Rural development was later added on as a sectoral issue to this

(Cont. on page No. 12)

from the labs

Eucalyptus oil is mosquite repellent :

Eucalyptus oil, extracted from its leaves, has been found a good repellent against mosquitoes and vermins and has germicidal effects, according to researches conducted at Forest Research Laboratory, Bangalore.

The eucalyptus oil is also valued in a number of pharmaceutical preparations like tooth pastes, perfumes and soaps.

The cineole content in the oil is found to be between 63 to 72 percent which compared very favourably to Australian "eucalyptus globulus", which contains maximum cineole ranging between 65 to 75 percent.

A sizable cottage industry based on distillation of eucalyptus leave has already come up in the Nilgiri hills.

(Hindustan Times 6 Sept. 83)

Unit for dehusking and grinding of foodgrains

A simplified process to dehusk and grind foodgrains simultaneously has now been evolved by the Central Food Technical Research Institute (CFTRI), by making certain additions modifications to the ordinary, plate-type grinder (chakki) which is extensively used for grinding of food materials.

The grinder (100kg/hr capacity) is fitted with a multideck sifter and an aspiration which are operated from the same motor of the grinder. This unit is capable of removing 90-95 percent of the bran present to foodgrains, and can grind the the grain into flour and soji which are of high nutritive value. The grains are wetted with a very small amount of water before grinding. The unit has been tested with jowar, maize, bajra and wheat, and has been found to work quite satisfactorily. It enables one to get a reasonably bran free flour and soji from coarse grains. The commercial model of this unit is expected to be ready shortly.

(CFTRI Newsletter)

New Painless Anti-Rabies Vaccine :

The Serum Institute of India (SII) has development a new painless anti-rabies vaccine, only three doses of which to be taken in the arm, are sufficient to get rid to the disease. At the moment, patients have to take a course of 14 painful injections in the stomach. The new vaccine is totally safe and is prepared on the human diploid cell.

The SII has also developed an anti-snake venom 'polyvelent' which can be used against of the four common poisonous snakes found in India-the cobra, the russel's viper, the common krait and the saw-scaled viper.

(Indian Express 4-10-83)

Coconut Thatch Roof Can Last Longer :

Coconut leaf thatch will last much longer if treated with copper sulphate solution and cashewnut shell oil. This simple technology whereby the life of coconut leaf can be extended to three years has been developed by the Regional Research Laboratory, Trivandrum.

The ordinary coconut leaf thatch an important roofing material in rural Kerala - has to be renewed annually at considerable expense and labour.

(Indian Express 30-9-83)

Mysore Lab Evolves Cheap Baby Food

A house wife can now buy the weaning food for her baby for just Rs. 6 to 7 a kilo. This is much cheaper than the baby foods available for Rs. 25 to 30 a kilo in the market. The weaning food consists of germinated ragi and green gram flour mixed in the ratio of 3 to 10 and just need to be added to boiling water. This food has more caloria value than the same volume of tinned baby foods.

This low cost baby food has been evolved by the Central Food Technological Laboratory (CFTRI) in Mysore.

(The Hindustan Times, 7 Sept, 1983)

CMERI Breakthrough In Mussel Beedings :

The Central Marine Fisheries Research Institute (CMFRI) has achieved breakthrough in breading mussel seeds in its laboratories.

Mussel, an important part of the diet of Kerala fisherman, is among the lowest in the marine food-chain, and its advantage is that it converts the primary producers (photoplankton) directly animal protein for human comsumption.

The success achieved by the Institute in breeding mussel will solve the seed problem once hatcheries are established for large scale seed production.

(Economic Times, 2-10-83)

CEL To Set up Plant To Make Solar Cells :

Central Electronics Ltd. (CEL) plans to set up a Rs. 10 crore SMW plant to manufacture solar cells for various industrial and consumer application besides solar pumps for drinking water in rural area.

(Hindnstan Times 2-10-83)

Fertilizer Factory Versus Biogas Plant

Shrikant Karanjekar,
CSV, Wardha

With progressive scarcity of petroleum products the problem of fuel and chemical fertilizers has shaken the whole world, and to solve this problem the use of biogas plants as an alternative universally accepted. In India the use of biogas began 20-25 years back. However, upto 1980, only 80.000 biogas plants were installed. In China, Biogas Technology was introduced somewhat later, still they have today 8 million gas plants. In India, during the sixth five year plans under the National Project for Biogas Development there is a target to instal 4,00,000 biogas plants. Out of this during the last three years, 98,000 biogas plants have been put up.

Need crore gas plants

The cattle population in India as per 1976 cattle census is about 240 million and about million households own three or more of the animals. Presently for the smallest size of gas plant which is in use (2 cabic meter capacity) dung of minimum three animals is required, so theoretically there is a potential of installation of 29 million individual gas plants in the country. Besides this it is estimated that 8 million households will have dung in excess of there needs and if they are motivated to share benefits with the rest of community, thousands of community biogas plants also can be installed. The Government however, has not made as serious any attempt to treat biogas as a chief alternative to fuel and fertilizer, as its potentiality warrants. The target of one lakh gas plants to be installed annually is so low that to get to the full potentialities of about 3 crore will take ages.

If we look at the Government policy of petroleum base fertilizer plants it is observed that upto the end of sixth five year plan (1985), 8 fertilizer plants for nitrogen and 11 fertilizer plants for phosphorus are going to be installed. These will require 2098 crore rupees investment, whereas for biogas plants less than one fourtieth of this is allocated for the same period. If the same investment of 2098 crores for the non-renewable source of manure was to be made in the renewable source sector 70 lakh biogas plants of 2 cubic meter capacity could be in stalled in our villages. Herein below is given a table of comparison of fertilizer plant Vs. Biogas Plants (Equal Investment).

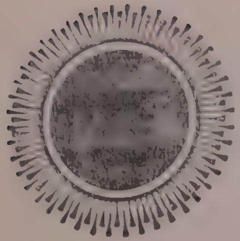
No.	Item	Anuual output from (8+11)=19 fertilizer plants	Annual output from 70 lakh biogas plants.
1.	Employment potentiality in persons	10,000	1,000,000
2.	Foreign currency	Some	Nil
3.	Pollution	adcs to	reduces
4.	Biogas Fuel in million M^3	Nil	5,110
5.	Humus in million tons	Nil	30.8
6.	Trace element ,, ,,	Nil	some
7.	Calcium (CaO) ,, ,,	Nil	0.77
8.	Potash (K_2O) ,, ,,	Nil	0.37
9.	Phosphorus (P_2O_5) ,, ,,	3.3	0.31
10	Nitrogen (N) ,, ,,	1.1	0.46

A Comparision :

It is clear from the above table that only Nitrogen and Phosphorus are sought to be made available from these Fertilizer factories. It has now been realized that the long range effect of the chemical fertilizers on crops is not good and that they have to be used in ever larger quantities, but the yield is not increased in that much proportion, moreover there is a retardation in the soil fertility as well. On the contrary when the organic manure in the form of effluent slurry from biogas plants is used, crops do not get nitrogen and phosphorus in as much concentrated form and so has a slow effect on crops but it gives all types of nutritive materials essential for the crops as well as humus which is very essential for the improvement of the fertility of soil.

Besides providing organic manure for crops, biogas plants will provide smokeless, hygienic fuel for cooking to 70 lakh households, whereas, for running the fertiizer factories, extra energy inputs will be required.

(conted. on page 12)



A Sunny Future For Villages-Photovoltaics

"In the Third World, just a few hundred watts of power-miniscule by industrial nation standards-can have an enormous effect on village life."

Dawn of a New Era

No other technology has the versatility of photovoltaics. David Morris of the Institute for Local Self-Reliance in the United States observes that, "Using the same energy source-sunlight and the same techno-logy, we could have the most decentralized or the most centralized from of electricity generation in history. The question of which uses for solar electricity will prove most economical and popular has already caused controversy. Advocates of centralized solar power cite the economic advantage of large photovoltaic systems since one set of power lines and control devices can serve a large installation. The partisans of decentralized solar electricity counter that if solar electric systems are placed on rooftops and fully integrated into industries and households, they could one day be cheaper than centrally generated power and permit energy independence as well. No clear resolution to this argument is in sight, and different use of solar power are likely to emerge simultaneously.

Growing Solar Market

The current market for solar cells is limited, focusing on specialized applications in areas not yet reached by utility lines. These remote-site uses are surprisingly numerous and diverse, however, spread throughout the developing and industrial worlds. And sales are growing rapidly. Portable solar cell modules, for example, are popular on boats and train cabooses Remote mountain cabins and scientific research stations are beginning to rely on photovoltaics rather than diesel generators A market for photovoltaics to power microwave repeaters and other communications installations is growing rapidly Additional future uses for photovoltaics can be found at remote military installations-amounting to 100 megawatts of new solar cells each year in the United States alone, according to one study. In these and many other uses solar electric systems are now more economical and reliable than other alternatives.

A Decentralized Energy System

During the next decade, small stand-alone uses for photovoltaics will almost certainly predominate. There are still millions of houses in remote areas of Austalia, Europe, North America and the Soviet Union that are not connected to power lines. And in developing countries, the majority of villages and rural areas still lack access to a steady supply of electricity. The dream of extending central grids into the "heart of darkness" has faded in the face of mounting Thirds World debts and the rising cost of vast networks of power lines. If millions of peasants and villagers are to have electricity in their lifetimes, most will have to rely on small, decentralized energy systems.

Solar Vs Diesel Pump

Today the only electricity alternative in most villages is a diesel generator. typically run just a few hours a day to supply power for agricultural equipment and for a few lights in the evening. But diesel generators are expensive and a bigger problem–unreliable. They require regular maintenance and an occasional complete overhaul. Since there are so few trained mechanics in rural areas, broken-down diesel generators are a common sight today throughout the Third World. A spare engine is normally recommended for diesel generating systems, to be used when the first breaks down. When maintenace and fuel costs are added to initial capital costs, diesel generated electricity price in industrial countries.

Several recent studies have reached similar conclusions about the cost of photovoltaics compared with diesel generating systems. For the small-scale uses for which diesels are inefficient and expensive, solar electric systems are already economical. Louis Rosenblum of the National Aeronautics and Space Administration (NASA) concludes that the break-even point for replacing a diesel generator with a solar system is now between one and three kilowatts, depending on available sunlight and the exact cost of the photovoltaics.

Electricity from the Sun

However, as solar cell prices fall 50 percent or more as expected in the next five years, solar power will become economical for virtually all electricity applications in Third World Villages.

Small-scale uses that are already economical include refrigerators for perishable food and medicines, acommunications systems, television sets, lights and mills, Water pumping is a particularly good use for solar electricity since sunlight is usually available when water is most needed and diesel pumps are oversized for many small farms and households. In the Third World, just a few hundred watts of power-miniscule by industrial nation standards can have an enormous effect on village life, providing basic amenities for the first time.

Since the late seventies, a large part of the market for photovoltaics has been in developing countries. Interest has been particularly strong in Philippines and Thailand, whose governments encourage the use of photovoltaics imported from Europe and the United States for communications, water pumping and other applications. A half dozen developing countries will soon have indigenous photovoltaics industries. In India and Pakistan there is a rapidly growing market for solar-powered micro pumps among small farmers. And the Pakistani government now plans to introduce solar electricity in 14 villages by 1984.

Sun on Sale

The foreign aid programmss of industrial nations have also begun to include photovoltaics, particularly those of France, the United states and West Germany France has had major programs under way since the mid-seventies to install solar-powerer pumps and television sets in West Africa. The television sets, modified to require as little as 20 watts of power, bring educational programmes to people in remote areas at a reasonable cost. The U. S. agency for International Development installed eight specially designed solar-powered vaccine refrigeratores at rural health centres in 1982 and has another dozen small-scale photovoltaics projects underway, mainly in Africa. In Somalia relief groups have brought in over a hundred photovoltaic water pumping systems to be used at refugee camps.

A Suuny Future

International efforts to promote photovoltics include studies and demonstration projects sponsored by the United Nations Development Programme (UNDP), the World Health Organization and the World Bank. Their reports note that no established and reliable market now exists for photovoltaic systems in most developing countries and that the quality of the equipment sold is uneven. In many areas, protecting solar arrays from dust storms and keeping them clean is also a problem. Development specialists, however, are generally confident that such obstacles can be over come, and that photovoltaics gradually will gain broad appeal for small-scale Third World uses. They are particularly interested in the potential of solar-powered pumping systems since the laek of fresh drinking water and adequate irrigation is one of the most urgent needs in many rural areas. By combining solar electric systems with efficient low-head pumps, peasants and villagers should have an inexpensive and relatively maintenance-free water supply.

(This passage is an excerpt from the chapter–' Villages and Rooftops '- of the Worldwatch Paper 52, entitled–' Electricity from Sunlight : The Future of Photovoltaics '–written by Christopher Flavin)

□ □

NEW LITERATURE

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10. **Ecoforum** :- a bimonthly journal of the Environment Liaison centre, P. Box 72461 Nairobri, (Kenya).
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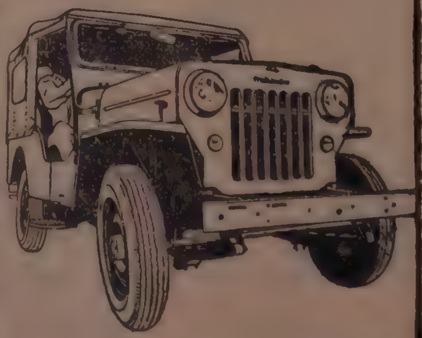


Losses In Food Grains

Unicef Report

At the 'First Asian Household Nutrition Appropriate Technology Conference, COLOMBO, SRILANAK, from 12th to 17th July 1981' sponsored by UNICEF, the committee's view on the various factors responsible for losses in food grains, such as drying, insects, birds, rats and micro-organisms was that :-

1) Traditional and existing practices of storage of foodgrains be further investigated and needed improvements/modifidated which would not only minimize the losses but also be acceptable to the community with respect to social and cultural standards. The modifications/improvements should be such that storage structures can be rat/bird proof and allow fumigation for insect control.

2) Existing storage practices such as use of salts and local materials like sand, ash, grasses, termeric, oil, smoke etc. should be investigated systematically to ascertain their usefulness and whether their adoption should be urged.

3) Testing/evaluation and thereafter adoption of new and suitable foodgrain storage structures/containers/bins at the village level is recommended. These should be low in cost, made from easily available material and easily fabricated by local artisans and people of the village themselves.

4) Losses in foodgrains due to insects and rodents are quite heavy. The suitable control measures like spraying, fumigation and use of rat poisons in villages should be standardized, and thereafter exteded for adoption by the villagers with due caution/advice as to their possible toxicity. It would be necessary to make the pesticides etc. available for use by the farmers thereafter.

5) In view of women's responsibility for proper storage of foodgrains in houses, it will be necessary for greater involvement of women. Necessary arrangements should be made for training at various levels in methodology of storage, rat-control and control of other factors responsible for losses in foodgrains.

6) Along with the above measures, and within the parameters of existing financial resources, efforts should also be made to undertake loss-assessment studies of foodgrains at various levels in order to learn precide magnitudes of losses and to consider investments at each level.

7) In view of the lack of facilities of cold storage freezing freeze-drying, canning, dehydration fermentation using chemicals, eradication, etc; there are considerable losses of fresh fruits and vegetables. The group, after considerable of various aspects, recommends extension/propagation of locally and easily adoptable methods in villages for preservation of vegetables and fruits, viz, keeping with suitable wax (wherever possible), sun-drying (after cutting/treatment or as pulp in mango) and preservation of vegetables in pieces by dipping and steeping and other locally developed methods.

Science & Technology For Women

The "Science for Villages" devotes a portion of the magazine to the above subject and is assisted financially for this by the Department of Science & Technology's (Govt. of India) Section on 'S & T for Women'. We request our readers to send us problems that they may identify on solutions and information on the following heads of this subject :

- Employment generation.
- Drudgery reduction
- Drinking water and sanitation
- Nutrition and health improvement.
- Hazards and accidents protection.

Please write to Editor, Sciende for Villages, Magan Sangrahalaya, Wardha – 442 001.

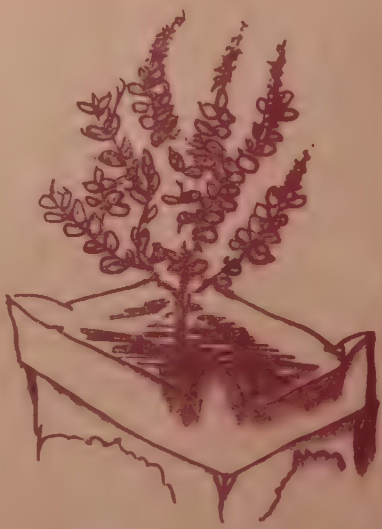
HOME CURES FOR COUGH AND COLD

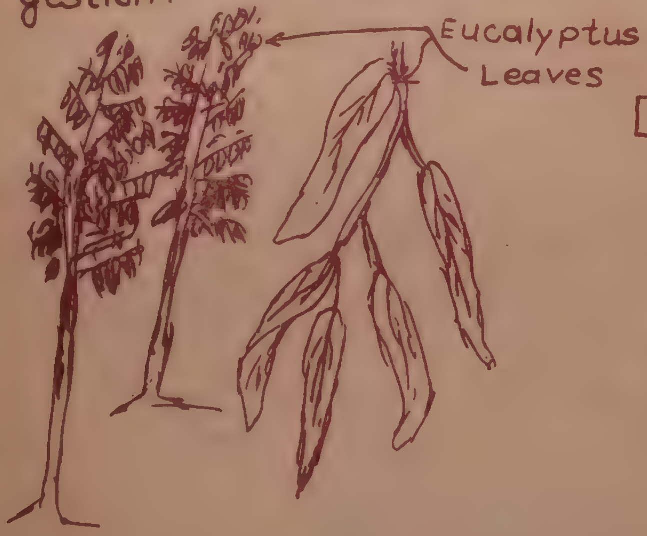
Many plants have curative powers. Some of the best modern medicines are made from wild herbs.

(COUGH AND COLD)

1) If a child has cough and cold:

- Crush some 'Tulsi' leaves. Give one or two drops of this juice three times a day to babies.
- Heat two teaspoons of oil. Crush one tablespoon of camphor (Kapoor or Karpura). Dissolve this in the oil. Keep it stored in airtight bottles. This can be rubbed on the chest and throat of the child to relieve congestion.





[2] If an ~~and~~ adult has cough and cold -

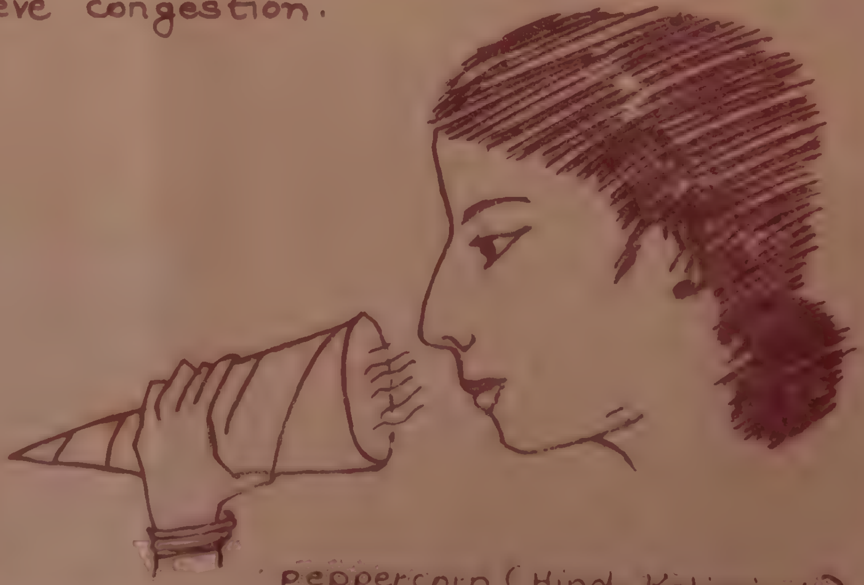
Boil a handful of eucalyptus leaves in two glasses of water, till only one glass is left. Strain this water and add sugar. Drink this three times a day.

Another effective medicine for cough and cold is leucus aspers (Guina). This is a wild plant with white bellshaped flowers. Boil the leaves in water with a pinch of turmeric powder (haldi). Inhale the steam. This helps to relieve congestion.

Sinusitis (STUFFY NOSE):

3) Soak a piece of turmeric in castor oil and burn it. Inhale the fumes.

- Burn a peppercorn (Hindi - Kalimirch, Tamil - Milagu) Make a paper cone and keep



peppercorn (Hind- Kalimirch)

the pepper at the narrow end of the cone. Inhale the fumes through the cone.

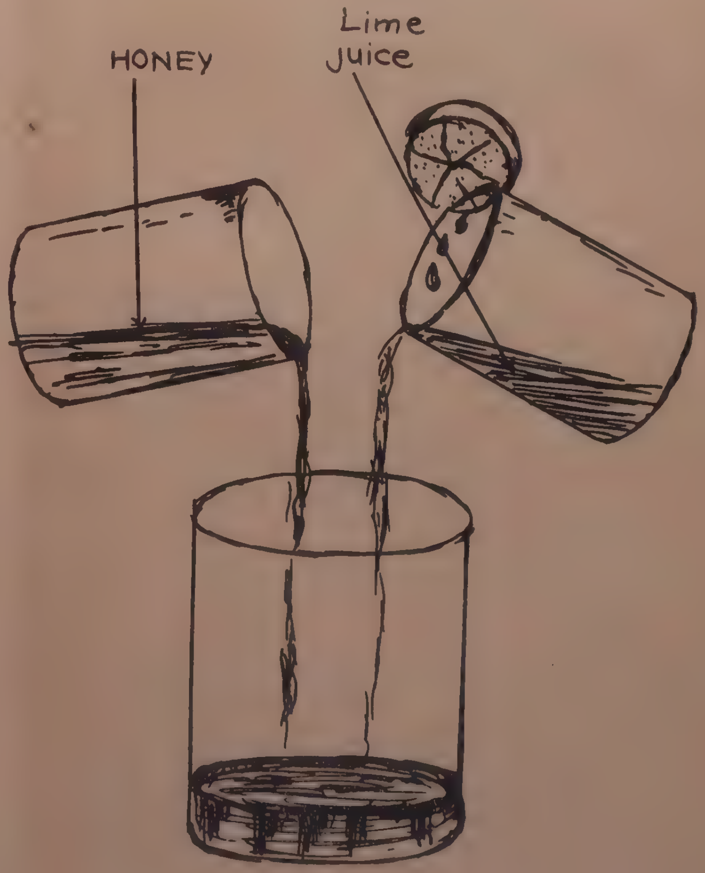
- Roast garlic in hot ash and take in three times a day.
- Mix together half a cup of bitter gourd (Hindi - Karela, Tamil: Paharkai) juice, half a lime juice and one tablespoon of honey. Drink three times a day.
- Keep a cut onion in the sick person's room. The virus of the cold will settle on this. This helps prevent cold from spreading from one person to the other.

Sore Throat :

4)

- Mix equal amounts of honey and lime juice. One tablespoon every ten minutes is very smoothing to the throat.
- Boil some water. Add the juice of one lime and sugar or salt. Take this hot.

Boil milk with a pinch of turmeric powder and drink it hot.



SORE THROAT CURE

points to ponder

Vitamins Can Harm you

Excessive and indiscriminate intake of vitamins can be associated with toxicity and needs to be curtailed in a poor country like India, according to a study by the National Institute of Nutrition (NIN), Hyderabad.

The study carried out recently found that a wide discrepancy existed in the sale of nutritional products in comparison with the prevalence of deficiencies in the population of Hyderabad and Secunderabad.

Dr. Kamala Krishnaswamy and her colleagues who conducted the study said it is ironic that the people should be spending money on products like tonic and vitamins so freely when a balanced diet can provide them with the necessary ingredinets at a much lower cost.

(The Hindustan Times 6 Oct. 83)

Infant Mortality In Third World Worries WHO :

12 millions children die each year before their first birthday-roughly 10 per cent of all those born. Another 4 per cent die before they are five years old. Simple, curable diarrhoea takes six million young lives. Another five miilions are claimed by measles, whooping cough, polio, tetanus, diptheria and tuberculosis. Thousands more, die of pneumonia, malaria or schistoomiasis (bilharzia). These are almost all curable diseases. The medical knowledge is well established. All that now needs to be done is to put back knowledge to work. The price of life for millions of children in the third world is $ 12.5 a year. Extra $ 50 billion involved were "two thirds of what the world spends each year on cigarettes, or just one fifteenth of global military spending-the WHO says in a special report.

(Times of India 1-10-83)

Nitrogenous Fertilisers Dangerous

Excessive use of nitrogenous fertilisers might alter the chemical composition of food grains and pose a serious health hazard, according to a survey conducted by the Industrial Tixicology Research Centre, Lucknow.

The report said high levels of unassimilated nitratenitrogen had been found in some leaf crops like the spinach.

Infants consuming baby food processed from such contaminated products develop severe blood circulation trobles and related diseases.

There is also a possiblity that the concentrations of nitrogen and nitrate-nitrogen in food materials may interact and produce nitrosamines which are known to be cancer producing, the report said,

Greatest Population Leap

Earth's population swelled by 82 milion in the past year and now stands at 4.7 billion, up nearly one billon in a decade for the greatest numerical leap in history, the US census Bureau reported.

The Census Bureau said the annual growth rate remained basically steady at 1.75 per cent for 1982-83 but said the gain was the largest ever recorded in sheer numbers.

The world population stood at 3.7 billions in 1970 and was officially estimated at 4.7 billion at the end of June, up more than 800 million from the 1972-73 figure. In 1980, the global population was just less than 5.5 billion.

It was 3.1 billion in 1960.

The rate of increase peaked at 2.2 per cent in 1964-65 amid wide-spread fears of a "population explosion'. But the rate declined slowly over tne next five years and sharply in the next five, the bureau said. The rate has fluctuated around 1.7 per cent to 1.8 per cent a year.

Five nations account for just more than half the world's population. Fifty-two percent of the people are in China, India, the Soviet Union, the United States and Indonesia, in that order.

The five greatest contributors to the 1982-83 increase were India with 15.5 million, Indonesia with 3.2 million, Brazil with 3 million and Bangladesh with 2.9 milion, the commerce department agency said.

For the United States, the growth rate for the 12 month period was 0.9 per cent, with the population rising from just more than 232 miliion to nearly 234.2 million.

European nations, the bureau reported, accounted for just 1.5 miliion of the increase, and five nations- East Germany, Hungary, Denmark, Malta and West Germany lost population.

Possible steps out of the crisis

First, of course, we must become aware of the limitations which science and technology are bound to meet when proceeding in the same manner and direction as before : the limitations of non-renewable resources; the limitations of the psychological burden imposed on man by the excess of information, isolation, and loss of values; and the willingness of people to carry out certain demeaning labor which today's technology cannot be without. The conclusion from these realizations will always be the same, namely that further unrevised development of today's technological and economic structures will simply become impossible, be it because the resources will dry up, because the environment will be ruined, or because the people will rebe against this.

—Eduard Naudascher

WOMEN : OCCUPATIONAL HAZARDS

In a meeting of Experts on occupational Hazards of Indian Women - held in Department of Science & Technology on September 17, 1983 Dr. (Mrs) Manju Sharma gave the background relating to this meeting and said that in the first meeting of the Expert Group, it was decided that a State - of - the - Art report be prepared on the occupational Hazards faced by Indian, Women, so that solutions based on science and technology inputs could be outlined. This will help in identifying/formulating and implementing R & D projects to minimise the problems of women particularly in rural areas. Dr. Visawannathan pointed out that it was essential to lay out the criteria for identifying the women intensive occupations and hazards and for carrying out predictive toxicological evaluation of hazardous substances. He pointed out that no such study has so far been conducted in India with specific reference to women.

Dr. Ramachandran noted that 70 to 80 per cent of the women working in the watch assembly units had developed refractive errors and myopia. Similarly 80 per cent of the women engaged in the coir industry developed hand injuries while making ropes. The rope making machine needs further improvement and extensive popularisation. Elephatiasis was also highly prevalent amongst women coir workers and the reason for this has to be looked into. Tea plantation workers were prone to hazards due to toxicity of pesticides. weedicides and fertilizers. Further studies were needed in this area as well. Studies on suspectibility of women engaged in slate pencil manufacture to respiratory ailments should also be undertaken.

Mrs. Anila Dholakia suggested that hazards involved in women exclusive industries such as block printing, quilt making and Agarbatti industry should also be investigated into.

Dr. Tripti Sharma mentioned that the psychological aspects of occupational hazards faced by women should also not be overlooked, specially the effects of anaesthetics on anaesthesiologists. The effect of mechanisation on the performance of women executive is yet another area which should be studied. Most of the office furniture/facilities were earlier created to suit the physique of men since now several women are in executive jobs, these facilities need to be redesigned to suit women.

Ms. Bezboruah drew attention to the occupational hazards particularly from the viewpoint of environmental sanitation faced by women working in fields and roads where they are no toilet facilities should also be looked into.

Miss Shanti Chakravorty felt that some priority areas for taking up R&D and intervention programmes must be emphasised and new programmes implemented in these fields. ▣

Dear Reader,

We hereby take pleasure in announcing that our next issue is the special Science Congress Issue. We would like to bring out this special number in time for the Indian Science Congress being held at Ranchi, Bihar from 3rd to 8th January 84, So, our next number would at be a combined December-January issue.

- Editor

पढिये !

पढिये !

पढिये !

गरीब की झोपडी और राष्ट्र की आधुनिक विज्ञान-प्रयोगशालाओं के बीच सेतु का काम करनेवाली हिन्दी की पहली पत्रिका –

"ग्रामोपयोगी विज्ञान"

इस पत्रिका में आपको मिलेगी –

- देश और विदेश की प्रयोगशालाओं में गावों के विकास में सहायक होनेवाली खोजें ।
- नई तकनीकों की सचित्र जानकारी जिनको गांव में नये उद्योग और विकास लाने में लागू कर सकें ।
- गांव की समस्यायें और उनके तकनीकी हलों के सफल प्रयोग ।
- विज्ञान के क्षेत्र में ग्रामोपयोगी चिंतन ।

वार्षिक शुल्क : 5 रुपये (व्यक्तिगत) 10 रुपये (संस्थागत)

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(from page no. 1)

development model. Apart from the model's irrelevance for Third World countries and its narrow orientation, the realities of the quantity and quality of foreign aid and transfer of technology to supplement endogenous scarce capital, as well as weak skewed internal terms. The model assumption of rapid growth. When technology was implanted in Third World countries with little relation either to real factor endowment, particularly labour, or to the existing technological stock, the entire process was wasteful and the contradiction too numerous."

It is quite right that unless we de-mystify the relationship between technology and development inherent to the old framework of developmont in wider human terms, the world will not achieve what UNCSTD aimed at.

Devendra Kumar

(from Page no 3)

With the same amount of investment, employment potential created from installation of biogas plants is 100 times more than that created from installation of fertilizer plants and this employment will be available in decentralised form in the villages itsalf, so that rate of migration of unemployed youth to cities will be reduced.

It is therefore concluded that instead of installation of fertilizer plants, if the programme of installation of biogas is taken on massive scale (installation of at least 5 million gas plants in five years), then the dung available from the total cattle population can be utilised in proper way and the energy will be available in decentralised way, destruction of forest will be checked good organic manure will be available to crops, pollution will be reduced, fertility of soil will he improved and overall, employment opportunity on a massive scale will be created in villages itself.

How You Can Help Us

- Send for publication, your experiments and experiences or information in rural technology you come across.
- Enroll subscribers (annual subscription for individuals Rs. 15/- and Institutions Rs. 25/- in India and for abroad, US Dollars 10 and 15 respectively), by sending addresses whom a free sample copy will be sent.
- Solicit appropriate advertisements to help financing this publication (Rs. 1000 for ful Page, Rs. 500 for half and Rs. 300 for quarter page per insertion.)

Please write to : **The Editor, Science for Villages, Magan Sangrahalaya, Wardha, 442001. (M. S.) India,**

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— Losses in food grains

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Cover pages printed on Hand Made Paper : Prited and Published by Devendra Kumar on behalf of Science for
villages, Wardha, Editor : Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan
Sangrahalaya, Wardha-442001. Printed at Samyayog Printing Press, Wardha. Regd. No. WDA-119

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CIENCE FOR VILLAGES

ing a Bridge between the Science Lab and the Village Mudhut

5-76, Dec. 1983—Jan. 1984, Monthly, Annual Subscription : Rs. 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

This monthly in its seventh year is dedicated to rural technology and a decentralized economy where man is in harmony with his inner self, brother Man and mother Nature of which he is a component.

This Special Issue on the occasion of Indian Science Congress at Bishunpur, Bihar, is to draw the attention of the Nation's scientists to their responsibility towards Rural India.

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from the labs

In this Column, we invite Techniques evolved in the labs of India as can benefit the Villages and help in creating a new order.

Manipal Biogas Plant :

A new biogas plant designed by Prof. G.R. Rai of Manipal Institute of Technology, Manipal-576119, is claimed to be 75% cheaper than the conventional KVIC plant. Besides, it overcomes the well known drawbacks of both the Indian model (movable gasholder) and the Chinese fixed-dome model.

The 'Manipal model' biogas plant was developed with financial assistance from the Agriculture Foundation of Syndicate Bank, Manipal.

The new plant uses a suitably disigned rectangular masonry tank covered with a sloping RCC slab for digester cum-gas-storage space. There is a floating gas-holder made of ferrocement on top of a manhole provided on the slab. This drum is small in size but its dimensions are designed to produce desired pressure in the gas storage chamber, thus affording pressure control. The gas-holder can be easily lifted up for inspection, repairs or maintenance.

The inlet and outlet for the digester can be designed to suit the charge, whether slurry or solid. A simple arrangement is provided for withdrawing gas.

The construction of the plant is very simple and its various units can be easily conveyed from one place to another. Maintenance problems are nil.

The Manipal model is wellsuited for all types of locations, especially waterlogged areas. Any size of the plant can be constructed with the same standard ferrocement drum. The model is highly flexible for adoption of different raw materials.

(Invention Intelligence)

Solar Tricycle for Handicapped:

A tricycle for the handicapped that runs on solar energy has been developed by the Central Electronics Limited, Sahibabad, Uttar Pradesh.

A modification of the common hand-operated cycle, used by the handicapped, it is fitted with a 24 volts D.C. motor, which is powered by a set of two 12-volt lead-acid storage batteries, which are placed under the driver's seat.

These are charged by a solar power-pack which forms the roof of the tricycle. The panel, consisting of solar silicon cells, collects sunlight and these are four modules totally costing Rs. 7,000. The solar energy thus obtained charges the batteries.

The vehicle can attain an average speed of 8 km/hr and runs for about 12 km a day, i.e. 90 minutes in a day. However, it cannot climb steep slopes. When not working on solar energy, it can be pedalled by hand.

Normally, the cycle is kept parked in sunny areas when not in use, so that the batteries get adequately charged. The cycle has been fitted with front and rear lights, that also work on solar electricity. A luggage carrier has been provided at the back.

Costing about Rs. 10,000, the tricycle has been developed under a project sponsored by the Commission for Additional Sources of Energy, Department of Non-conventional Energy Sources, Government of India.

(Invention Intelligence)

New Herbicide :

Gharda chemicals, MIDC, Dombivli, Thana district of Maharashtra, has developed a new and highly effective herbicide called Isoproturon. It is a pre and post-emergent selective weedicide belonging to the relatively non-toxic family of substituted alkylanyl areas. It is effective in controlling grass weeds and can increase wheat production by 25 per cent.

(Economic Times, 31 Oct. 83)

DEVELOPMENT

A British Government White Paper on Overseas Development some years ago stated the aims of foreign aid as follows :

"To do what lies within our power to help the developing countries to provide their people with the material opportunities for using their talents, of living a full and happy life and steadily improving their lot."

It may be doubtful whether equally optimistic language would be used today, but the basic philosophy remains the same. There is, perhaps, some disillusionment : the task turns out to be much harder than may have been thought —and the newly independent countries are finding the same. Two phenomena, in particular, are giving rise to world wide concern—mass unemployment and mass migration into cities. For two-thirds of mankind, the aim of a "full and happy life" with steady improvements of their lot, if not actually receding, seems to be as far away as ever. So we had better have a new look at the whole problem.

Many people are having a new look and some say the trouble is that there is too little aid. They admit that there are many unhealthy and disrupting tendencies but suggest that with more massive aid one ought to be able to over compensate them. If one available aid cannot be massive enough for everybody, they suggest that it should be concentrated on the countries where the promise of success seems most credible. Not surprisingly, this proposal has failed to win general acceptance.

One of the unhealthy and disruptive tendencies in virtually all the developing countries is the emergence, in an ever more accentuated form, of the 'dual economy', in which there are two different patterns of living as widely separated from each other as two different worlds. It is not a matter of some people being rich and others being poor, both being united by a common way of life : it is a matter of two ways of life existing side by side in such a manner that even the humblest member of the one disposes of a daily income which is a high multiple of the income accruing to even the hardest working member of the other. The special and political tensions arising from the dual economy are too obvious to require description.

In the dual economy of a typical developing country, we may find fifteen per cent of the population in the modern sector, mainly confined to one or two big cities. The other eighty-five per cent exists in the rural areas and small towns. For reasons which will be discussed, most of the development efforts goes into the big cities, which means that eighty-five per cent of the population are largely by passed. What is to become of them ? Simply to assume that the modern sector in the big cities will grow until it has absorbed almost the entire population—which is, of course, what has happened in may of the highly developed countries—is utterly unrealistic. Even the richest countries are groaning under the burden which such a maldistribution of population inevitably imposes.

In every branch of modern thought, the concept of 'evolution' plays a central role. Not so in development economics, although the words 'development' and 'evolution' would seem to be virtually synonymous. Whatever may be the merit of the theory of evolution in specific cases, it certainly reflects our experience of economic and technical development. Let us imagine a visit to a modern industrial establishment, say, a great refinery. As we walk around in its vastness, through all its fantastic complexity, we might well wonder how it was possible for the human mind to conceive such a thing. What an immensity of knowledge, ingenuity, and experience is here incarnated in equipment. How is it possible ? The answer is that it did not spring readymade out of any person's mind ; it came by a process of evolution. It started quite simply, then this was added and that was modified, and so the whole thing became more and more complex. But even what we actually see in this refinery is only, as we might say, the tip of an iceberg.

What we cannot see on our visit is far greater than what we can see : the immensity and complexity of the arrangements that allow crude oil to flow into the refinery and ensure that a multitude of consignments of refined products, properly prepared, packed and labelled, reaches innumerable consumers through a most elaborate distribution system. All this we cannot see. Nor can we see the intellectual achievements behind the planning, the organising, the financing and marketing. Least of all can we see the great educational background which is the precondition of all, extending from primary schools to universities and specialised research establishments, and without which nothing of what we actually see would be there. As I said, the visitor sees only the tip of the iceberg : there is ten times as much some where else, which he cannot see, and without the 'ten' the 'one' is worthless. And if the 'ten' is not supplied by the country or society in which the refinery has been erected, either the refinery simply does not work or it is, in fact, a foreign body depending for most of its life on some other society.

Now, all this is easily forgotten, because the modern tendency is to see and become conscious of only the visible possible and keep it going.

Could it be that the relative failure of aid, or at least our disappointment with the effectiveness of aid, has something to do with our materialist philosophy which makes us liable to overlook the most important preconditions of success, which are generally invisible? Or if we do not entirely overlook them, we tend to treat them just as we treat material things—things that can be planned and scheduled and purchased with money according to some all-comprehensive development plan. In other words, we tend to think of development, not in terms of evolution, but in terms of creation.

Our scientists incessantly tell us with the utmost assurance that everything around us has evolved by small mutations sieved out through natural selection. Even the Almightly is not credited with having been able to create anything complex. Every complexity, we are told, is the result of evolution. Yet our development planners seem to think that they can do better than the Almightly that they can create the most complex things at one throw by a process called planning, letting Athene spring, not out of the head of Zeus, but out of nothingness, fully armed, resplendent, and viable.

Now, of course, extraordinary and unfitting things can occasionally be done. One can successfully carry out a project here or there. It is always possible to create small ultramodern islands in a preindustrial society. But such islands will then have to be defended, like fortresses, and provisioned, as it were, by helicopter from far away, or they will be flooded by the surrounding seas. Whatever happens, whether they do well or badly, they produce the 'dual economy' of which I have spoken. They cannot be integrated into the surrounding society, and tend to destroy its cohesion.

We may observe in passing that similar tendencies are at work even in some of the richest countries, where they manifest as a trend towards excessive urbanisation towards 'megalopolis' and leave, in the midst of afflunce, large pockets of poverty-stricken people, 'drop-outs', unemployed and unemployables.

Until recently, the development experts rarely referred to the dual economy and its twin evils of mass unemployment and mass migration into cities. When they did so, they merely deplored them and treated them as transitional. Meanwhile, it has become widely recongnised that time alone will not be the healer. On the contrary, the dual economy, unless consciously counteracted, produces What I have called a 'process of mutual poisoning', whereby successful industrial development in the cities destroys the economic structure of the hinterland, and the hinterland takes its revenge by mass migration into the cities, poisoning them and making them utterly unmanageable. Forward estimates made by the World Health Organisation and by experts like Kingsley Davies predict cities of twenty, forty, and even sixty million inhabitants, a prospect of 'immiseration' for multitudes of people that beggars the imagination.

Is there an alternative? That the developing countries cannot do without a modern sector, particularly where they are in direct contact with the rich countries, is hardly open to doubt. What needs to be questioned is the implicit assumption that the modern sector can be expanded to absorb virtually the entire population and that this can be done fairly quickly. The ruling philosophy of development over the last twenty years has been: 'What is best for the rich must be best for the poor.' This belief has been carried to truly astonishing lengths, as can be seen by inspecting the list of developing countries in which the Americans and their allies and in some cases also the Russians have found it necessary and wise to establish 'peaceful' nuclear reactors in—

Taiwan, South Korea, Philippines, Vietnam, Thailand, Indonesia, Iran, Turkey, Portugal, Venezuela—all of them countries whose overwhelming problems are agriculture and the rejuvenation of rural life, since the great majority of their poverty-stricken people live in rural areas.

The starting point of all our considerations is poverty, or rather, a degree of poverty which means misery, that degrades and stultifies the human person; and our first task is to recognise and understand the boundaries and limitations which this degree of poverty imposes. Again, our crudely materialistic philosophy makes us liable to see only 'the material opportunities' (to use the words of the White Paper which I have already quoted) and to overlook the immaterial factors. Among the causes of poverty, I am sure, the material factors are entirely secondary—such things as a lack of natural wealth, or a lack of capital, or an insufficiency of infrastructure. The primary causes of extreme poverty are immaterial; they lie in certain deficiencies in education, organisation, and discipline.

(*An excerpt from the world famous book 'small is beautiful' by E.F. Schumaker*).

C.S.V. At Work : A Glimpse

The work of Centre of Science for Villages (C.S.V) was started from the place where Mahatma Gandhi began his rural technology experiments in the mid thirties through the Institution called 'All India Village Industries Association (A.I.V.I.A) by one of his associates who had worked earlier in AIVIA since 1946. The C.S.V. was started in 1976 at Wardha which is almost the central point on the map of India and is a very poor district with hardly 6 percent land under irrigation but having a long history of experiments in rural development under the guidance of people who worked with Gandhi.

Collection of Information & Documentation

For two years (1976 and 1977) before the CSV could take up any project activities, it was felt necessary to collect information on the appropriate technologies from various parts of the country as well as outside. For this 4 areas were chosen, namely : (1) Rural Housing and Environment (2) Fuel and Energy (3) Non-conventional new industries (4) Rural tools & equipments.

It was understood from the beginning that the work of agriculture and other land based activities should not form an important aspect of our activities since there are many other agencies already engaged in these fields in India and these do not directly benefit the landless poor who form about 1/4 to 1/3 of the village families. The CSV, therefore, specialised in non-land based and non-conventional technologies which could spcifically assist the rural poor.

On the basis of the information gathered, a pamphlet entitled 'Techniques for the Rural Poor' was brought out and an international seminar on 'Techniques Appropriate for the Rural poor of the Third World' was organised at Sewagram (Wardha) in January 1978. In this seminar 20 institutions from abroad and 70 from India participated. This conference was inaugurated by Ivan Illich from the cottage where Gandhi lived in the village Sewagram. The Conference brought together information on the above four topics and provided linkages with such bodies which were working in this field.

The monthly journal named 'Science for Villages' was started in 1977 to disseminate the information that we received and could gather. In the middle of 1978 a Workshop on 'Rural Artisans & Technology' was held at Wardha in joint collaboration of CSV with the Council of Scientific & Industrial Research (CSIR), Government of India. This brought forward a list of technologies developed in various CSIR laboratories that were available for being taken to the villages. The workshop also highlighted the need for having voluntary agencies working in the villages which could act as links for transfer of technology between the laboratories and villages.

There was also a conference of prominent technologists and scientists of the country interested in rural technology in the last week of December 1978 when the parent body of CSV-namely Magan Sangrahalaya (Museum for rural technologies started by Mahatma Gandhi, 1938) observed its 40th Anniversary.

On the basis of the experiences gained during these initial two years, a portfolio of five projects on Programme for the Generation & Application of Rural Technology in Wardha District was prepared in 1978-79 and work on it started from March of 1979. The five projects being-(i) Construction Materials, (ii) Heavy Pottery, (iii) Construction Techniques, (iv) Banana Fibre & Paper Technology and (v) Energy : Bio-gas.

These last five years, the CSV is working on three concepts-(1) Collecting information and classifying it, (2) Based on the same, undertaking experiments in rural techniques through a team of three kinds of people-(a) scientists and technologists (no. about 15), belonging to various disciplines, (b) rural artisans and craftsman who know their subject well and help in undertaking innovations (no. about 10) and (c) rural youth who are unemployed and are prepared to learn and work in new technologies (no. about 30). With this group the five projects were run and many new techniques were found out which could be taken to the villages. (3) Selected techniques were picked up for being taken for demonstration in the villages and extension work done.

Appropriate Technologies-innovation & research :

In the field of innovation we have been able to make a mark in the following areas :—

(i) Utilisation of agro-wastes like plantain stems which in our area are not utilised for any other purpose after the annual crop has been taken. This raw material was

(DOORS MADE OF BANANA STEM)

collected and methods found to dry and store it. This was then used to make pulp for paper products and the pulping machine i.e. Hollandar Beater was greatly simplified and made cheaper and easier as could be constructed in the villages. Various products from plantain stem pulp have been found highly successful, namely-thicker varieties of paper which could be used for cover papers, file covers and other artistical requirements, 10 to 12 mm thickness boards were also made by hand process which are used in wall-partitions, panelling in furniture and doors and for sound proofing and insulation. A method to impregnate these boards by bitumen to make them water-proof for use in roofing material has been innovated. This is cheap and can be easily manufactured in the villages. A solar basket made by this pulp into a form of a paraboloid made a good reflector for cooking food. The efforts are on way to make still stronger boards by getting them pressed in a hot hydraulic press. This later development may give us a substitute for wood in certain respects and this can go a long way in saving timber.

(ii) In Biogas Technology we have been trying out various methods to make the gas plant simpler and cheaper. Uptill now we have designed a fixed dome type gas plant which compares well with the floating steel dome type but is less costlier and requires no repairs We have also designed gas burners made from red-clay, which the village potter can make himself and these have thermal efficiency comparable to the traditional cast iron stoves available in the market except that the price of the fired clay stove is almost 1/10th of the iron one. Our main work is going on in fabricating a gas plant made by series of fired mud pots connected to each other which serve as digester and the gas is collected not in a tank but polythene bags which could easily be handled. As this method will succeed we will be able to give a system which is much cheaper than the other ones available.

The spent slurry obtained from the gobar gas plants is being utilised for making organic manure which requires much less of cowdung and gives a manure within 100 days. In this method, with only 2½ per cent of cowdung in the total material which is to be composed, it consists of layers of vegetable waste, cowdung and powdered soil in anoverground tank which has windows in the masonary to allow the air to be

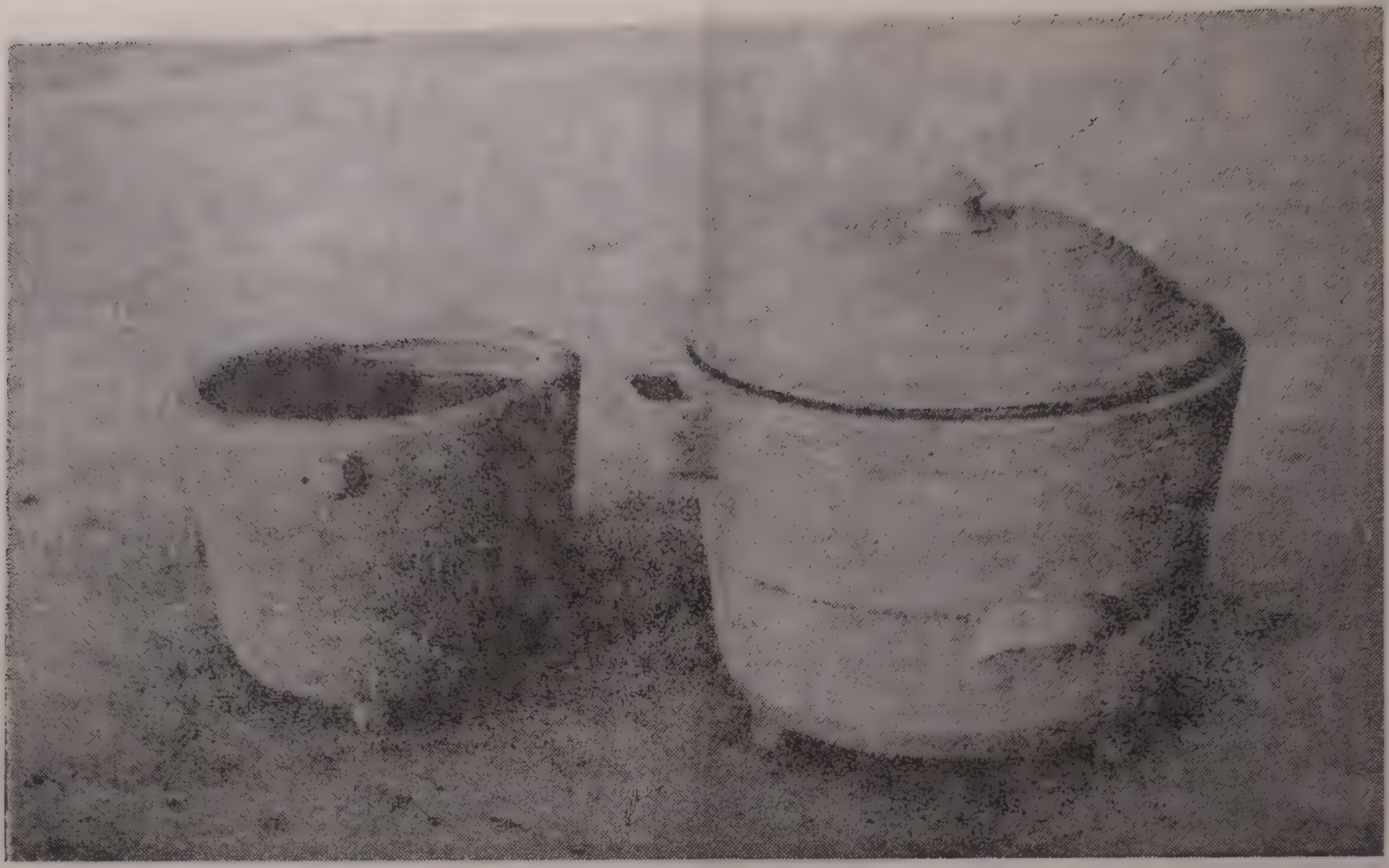
(JANATA 'FIXED-DOME' BIOGAS PLANT)

sucked in for aerobic fermentation of the material. Experiments in utilising other biomass for fermentation in 'gobar gas plants' are also being tried out with promising results.

(iii) Improving the pottery through the incorporation of new techniques has resulted in giving us the following new products : (a) Clay title which can be made without any expensive equipments and after firing used both for floors as well as walls, specially where mud wall is to be protected against rains. (b) A double wall cooling pot which can be used for storing the milk and other perishable foods, (c) The design of a smokeless stove, 'Magan Chulha', which can be pre-fabricated in fired clay in pieces and taken to the households to be joined together at his house, (d) Lavatory seats from red clay or terra-cota by giving it a low temperature glaze has been very effective, (e) A method of making pipes for irrigation as well as chimneys for smoke draft by using wooden moulds, (f) A large diameter clay ring of the size 2½ ft. dia. made in sections and fired was found suitable both for water reservoirs and gas plants as well as for lavatory pits.

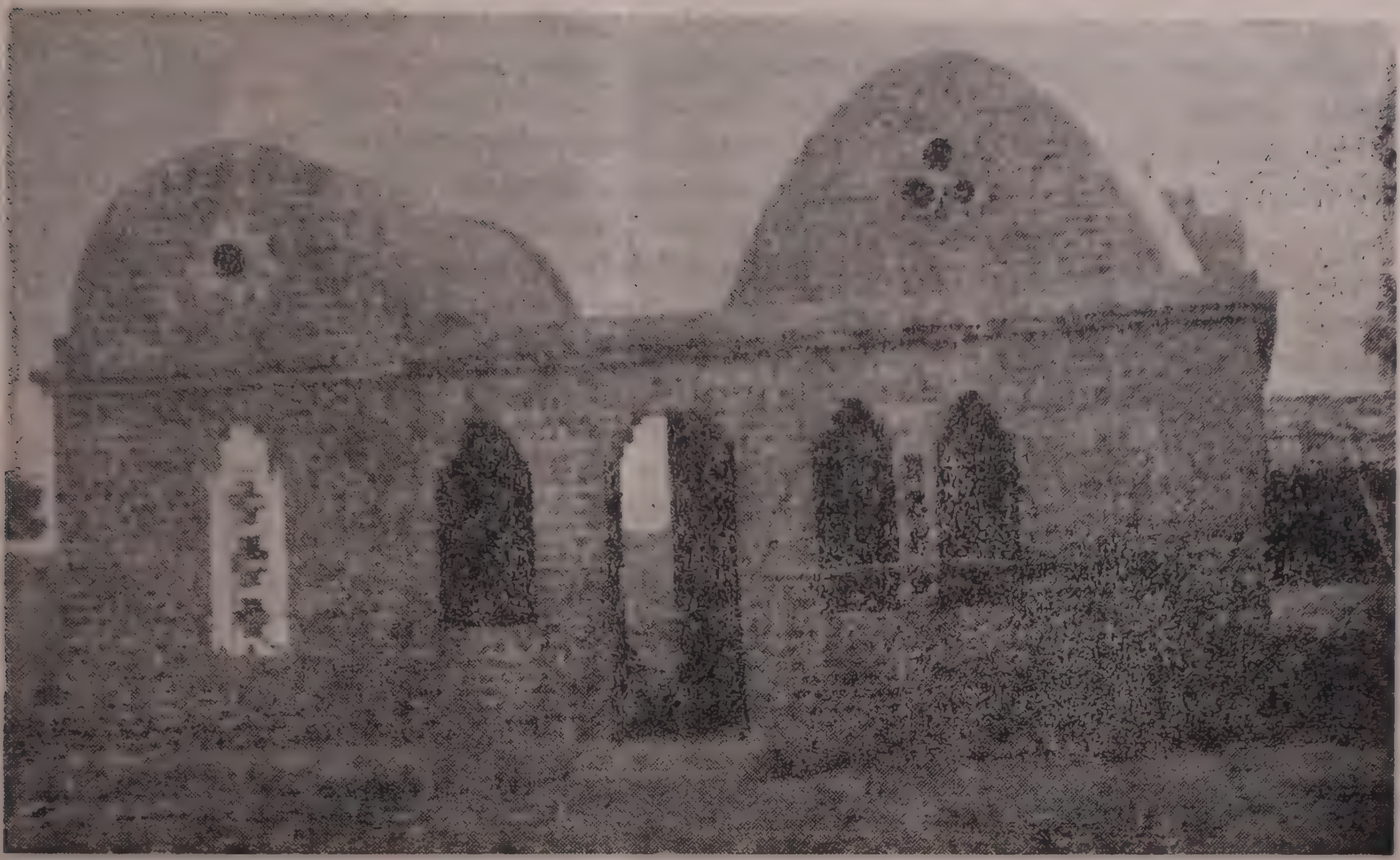
(iv) Work done on construction materials include (a) making of better mud for house building, (b) use of bamboo splits for reinforcing walls, (c) making of unbaked moulded bricks, baked bricks and pressed bricks, (c) finding substitute for Portland Cement by grinding in a 'ball mill'—slaked lime and pozollanic materials like paddy huskash/fly-ash/burnt clay. Lime pozollana (LP) made from this process is found quite efficient in making walls, plastering, flooring, wells, gobar gas plants and mosaic tiles etc. Almost all things that can be done by 'Portland Cement' except being used with the reinforcement can be done by LP too.

(c) Construction techniques from all sources pertaining to rural houses were studied and some simple methods adopted for rural housing. Many salient points that emerged out of the experiments done. Some of these could be enumerated as below (a) Cylindrical tiles, fitted with each other, can be made into an arch. This method was used for arch roof making on a base of shuttering. The semicircular dome of clay tiles was then plastered from above with LP and after due curing, the shutterings were removed. This gave a roofing that was cheap, did not require any annual repairs and was highly insulated due to air in the cylindrical gaps. This saves wood and timber used in the understructure. (b) Another roofing technique was that of Nubian Arch which can be built with bricks and mud-mortar



(MUD REFRIGERATOR TO KEEP VEGETABLES FRESH)

(WELL CONSTRUCTED WITH LIME-POZOLLANA CEMENT)



(HOUSE WITH THE 'NUBIAN ARCH' ROOF)

in a specific design requiring no shuttering or understructure. (c) The techniques of Central Building Research Institute of India-like avoiding wooden frames for doors and windows, manufacture of stone blocks by using rubble and mortar, brick panels for prefabricated roof and techniques to arrest erosion of mud walls by bitumen spray etc. were tried out successfully. (d) In rural sanitation and environmental engineering, also, a number of simple techniques in cheap lavatories, soak pits, urinals etc. have been tried out.

Extension in the Villages:

In the field of extension-65 to 70 villages have been taken up on the basis of about 8 small villages being looked after from one big village and the 8 big villages being managed from the nodal point of the CSV campus in the village Dattapur—5 Km. from Wardha town (population 60,000). We have in the last year undertaken the following techniques in the villages: (a) 250 biogas plants of fixed dome type were constructed. (b) In 35 villages, 115 houses of the poor (with mud walls) were given clay tile treatment and the treated mud walls withstood this year's heavy monsoon pretty well. (c) 90 wells, 300 houses and 20 water tanks were constructed by the use of lime pozzolana in place of portland Cement, (d) One village-Karla (Population 300)—was especially chosen for integrated development programme. Smokeless ovens, soak pits and fuel wood trees were introduced in Karla village. In this village we have installed a community lavatory connected to a gas plant, the gas from which is used to run an internal combustion engine connected to a Flour-Mill and the affluents are processed for being fed to an Algal tank producing 'Spirulina'—a highly nutritive human food, (e) The carpenters and blacksmiths of the 8 big villages are being contacted and brought together to learn the new techniques in making agricultural tools and other implements, (f) A school building with low cost techniques is being planned in one village which may become a model to be copied elsewhere in the district.

Documentation :

As can be seen from the process of development of CSV, the role of documentation and information in all the above activities has been very close. We are presently receiving more than 100 technical journal from various parts of India and almost the same numbers of technical journals from abroad.

We are regularly bringing out an English monthly journal (Science for Villages) and another bi-monthly journal in Hindi 'Gramopayogi Vigyan'. Periodically we bring out pamphlets on the results of our own researches as well as information about subjects of topical interest which we gather from other sources.

On the basis of the documentation files with us, we have been able to bring out a compendium of techniques which would assist the life of women. The same has been published by the Department of Science and Technology (D.S.T) Government of India and another version of this book has also been prepared by us which is illustrated with 225 diagrams and this is under print. We have also been asked to do the following on the basis of our documentation by the 'S & T for Women Cell', Government of India:

(1) Material for publication of four booklets for dissemination of information on S & T for Women. The following subjects could be prepared and presented to DST :—

(a) Household activities of women in the villages and towns and how improvement can be made in making them less drudgery-prone and more efficient.
(b) Improvement in community facilities and infrastructure in the village like sanitation wells, drains etc. as will improve the life of women.
(c) Common outdoor productive activities of village women in the fields and farms, cowshed, collecting ing fuel and fodder etc. and how technology could help.
(d) Some employment generating industries for women-case studies of successful experiments.

(2) A list of institutions both technology generating and field agencies (voluntary institutions) in India doing work in Science & Technology for women problems and the areas in which they are working.

The documentation cell and the library thus has served as the nucleus of growth of the CSV. All the technical staff and the various sections draw on the reservoir of knowledge thus generated. The documentation cell also helps CSV in approaching academic, technical and research institutions of the traditional type and to make them understand the approach of A.T. and the new information that is being brought out.

We are also having from time to time people working in the field of Appropriate Technology who would like to study in depth some specific technology about which we have sufficient information gathered. Some research scholars are also utilising our documentation cell.

Thus, beginning on the basis of documentation—a continued process—researches were undertaken and extension work planned. The documentation therefore is an important tool for all A.T. activities.

राष्ट्रीय प्रयोगशालाओं को गरीब की झोंपड़ी से जोड़ने वाली हिन्दी की द्वैवार्षिक पत्रिका

ग्रामोपयोगी विज्ञान

हमारी राष्ट्ररूपी श्रंखला की सबसे कमजोर कड़ी हैं हमारे गांव। जंजीर की मजबूती उसकी सबसे कमजोर कड़ी में होती है। आइए, इस कड़ी को दृढ़ बनाने में हमारा सहयोग करें—'ग्रामोपयोगी विज्ञान' पढ़कर।

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Sexist Economy

—**Ivan Illich.**

By the mid-seventies, the orientation of women's research on women's work and its economic analysis had changed. Studies began to struggle with insights that could not be properly expressed in the categories to which we had become accustomed in the fields of history, economics, ethnology, or anthropology. For their kind of research, the point was not woman's smaller bite into the salary cake. Something quite different was of greater significance: how to explain that in every industrial society women are discriminated against in employment only to be forced, when off the job, to do a new kind of economically necessary work without any pay attached to it. It was obvious to all concerned that women regularly lose out when they apply for a job, when they seek advancement, when they try to hold on to a paying position. But outside of and along with wage labor, which had spread during the nineteenth century, a second kind of unprecedented economic activity had come into being. To a greater extent and in a different manner from men, women were defeated into the economy. They were—and are—deprived of equal access to wage labor only to be bound with even greater inequality to work that did not exist before wage labor came into being.

The best evidence of the existence of the new weather economy comes from historians of housework. Their writings made me understand that the difference between housework past and present cannot adequately be put into traditional language, nor satisfactorily expressed in the categories of class analysis or social-science jargon. What housework is now, women of past did not do. However, the modern woman finds it hard to believe that her ancestor did not have to work in a nether economy. Irrefutably, the new historians of housework describe the typical activity of the housewife as something unlike anything women have done outside industrial society, as something that cannot be suitably accounted for as just one more facet of the unreported economy, and somethings the dogmatic categories of "social reproduction" simply cannot meaningfully signify.

Looking more closely at the phenomena anthropologists and historians of housework study, I began to see that the contemporary labor market, both reported and unreported, constitutes only the tip of an iceberg. True to this metaphor, most of the toil that supports the visible tip is below the waterline, work done in the nether economy. As employment in the various kinds of wage labor increases, the submerged drudgery must expand even faster. And modern housework is a typical, but not exclusive, part of that nether world's reality—work that is not only unreported but also impenetrable by the economic searchlight. And, since no commonly accepted nomenclature has yet been devised to make the distinction between housework and unreported market activities explicit, I shall contrast the spectrum of remunerated work done in the reported and unreported economy with a nether economy of shadow work, which forms its complement.

Unlike the production of goods and services, shadow work is performed by the consumer of commodities, specifically, the consuming household. I call shadow work any labor by which the consumer transforms a purchased commodity into a usable good. I designate as shadow work the time, toil and effort that must be expended in order to add to any purchased commodity the value without which it is unfit for use. Therefore, shadow work names an activity in which people must engage to whatever degree they attempt to satisfy their needs by means of commodities. By introduction of the term "Shadow work" I distinguish the procedure for cooking eggs today from that followed in the past. When a modern housewife goes to the market, picks up the eggs, drives them home in her car, takes the elevator to the seventh floor, turns on the stove, takes the butter from the refrigerator, and fries the eggs, she adds value to the commodity with each one of these steps. This is not what her grandmother did. The latter looked for eggs in the chicken coop, cut a piece from the lard she had rendered, lit some wood her kinds had gathered on the commons, and added the salt she had bought. Although this example might sound romantic, it should make the economic difference clear. Both women prepare fried eggs, but only one uses a marketed commodity and highly capitalized production goods—car, elevator, electric appliances. The grandmother carries out woman's gender-specific tasks in creating subsistence; the new housewife must put up with the household burden of shadow work.

Changes in housework reach far below the surface. Rising standards of living have made it more capital-intensive by providing numerous machines and gadgets. The investment in the household equipment of a median Canadian family—and the same would be true in every other modern home—is now higher that the median plant investment per factory job in two-thirds of all nations. As a result housework has decreased. For a minority of women, this has meant an interesting, well-paid part-time job and free time "to write their books or go fishing". But the "new" kind of household most present day women perform has also become more lonely, more dull, more impersonal, more time-polluting. Valium consumption and addiction to TV soap operas have often been regarded as indicators of this new, muffled stress. But much more fundamentally, housework has become the paradigm for the new unpaid economic activity that in a computer-policed and microprocessor-equipped society is economically more fundamental than productive labor, whether this production is recorded by economists or not.

Shadow work could not have come into existence before the household was turned into an apartment set up for the economic function of upgrading value-deficient commodities. Shadow work could not become unmistakably women's work before men's work had moved out of the house to factory or office. Henceforth, the household had to be run on what the paycheck bought—one paycheck for the engineer's and almost inevitably several to feed the hot carrier's family, whose wife took in piecework, while his daughter hired out as a domestic. The unpaid ungrading of what wage labor produced now became women's work. Women were then defined in terms of the new use to which they were being put. Both kinds of work, wage labor and its shadow, proliferated with industrialization. The two new functions, that of the breadwinner and that of the dependent, began to divide society at large. He was identified with overalls and the factory, she with an apron and the kitchen. For the wage labor she was able to find as a sideline, she received sympathy and low pay.

While, during the nineteenth century, technological change evolutionized work outside the household, at first it had little impact on housework routine, except for tightening the enclosure into which each housewife was locked. Tap water put an end to her carrying the jugs to and fro, but also to her meeting friends at the well. While women's work was economically without precedent, technically it seemed to go on as always. Indoor plumbing and the new fuels, gas and electricity, which were to become nearly universal in U.S. urban areas by 1920 and in small towns by 1930 were for the great majority of people no more than technological possibilities at the turn of the century. Only as recently as the second quarter of this century did technology really change the material reality of housework; simultaneously, radio and TV began to act as substitutes for community conversation. Industry then started to produce machinery for shadow work. As industrial work became less labor-intensive, housework, without diminishing became by several orders of magnitude more capital intensive.

Economic progress is usually measured by the number of work places, meaning jobs, that are created. But it can with equal right be called that process by which more goods are offered on the market, each new commodity requiring a greater "input" of shadow work. Development conventionally means that production has become more capital-intensive; it can just as well be described as the course through which more and more capital-intensive shadow work is made necessary for the achievement of a minimum level of well-being. It is highly improbable that the volume of productive wage labor will ever again increase anywhere in the world, or that make-work, now called "service," will be paid for as extravagantly as has occurred up to now. Rather, I expect that automated production will decrease the overall volume of wage labor and lead to the marketing of commodities requiring more, not less, unpaid toil by the buyer/user. This shadow work as wage labour decreases—will further accentuate a new kind of sexual discrimination within shadow work.

Shadow work is not women's exclusive domain. It is as clearly genderless as wage labor. Unpaid work to upgrade industrial production is done by males, too. The husband who crams for an exam on a subject he hates, solely to get a promotion; the man who commutes every day to the office—these men are engaged in shadow work. True, the typical "consumer" is "the household", and this if run by women alone who carried the burden of shadow work, it would be silly to say that, within the realm of shadow work, discrimination works against women. Yet this is precisely what happens. In shadow work much more intensely than in wage labor, women are discriminated against. They are tied to more of it, they must spend more time on it, they have less opportunity to avoid it, its volume does not diminish when they take outside employment, and they are penalized more cruelly when they refuse to do it. What women are cheated out of through discrimination in reported and unreported jobs is only a small fraction of the shadow price due them for their unpaid shadow work in the home.

BUILDING WITH THE SUN

To the surprise of many technologists, the oldest and simplest use of solar energy is proving to be among the most successful in the 1980. Just a decade ago, it was commonly known that residential solar heating had to mean the use of pump-driven "active" systems employing solar collectors. Yet today, passive solar or climate sensitive design is one of the most rapidly growing uses of solar energy despite a minimum of government support. The reason is simple: Passive solar buildings use relatively simple, inexpensive change in design and construction techniques to maintain comfortable temperatures. By combining design concepts that have been known for centuries with modern building materials and technologies, builders are constructing houses that use 75 to 90 per cent less fuel than conventional ones at only small additional cost.

The principles being applied in climate-sensitive designs are quite natural conditions to the best advantage. The designs are intended to admit sunlight during the winter but keep it out in the summer. Insulation and thermal mass are used to prevent rapid temperature changes. Of course, the emphasis is on maximum "solar gain" in cold, sunny areas and on keeping the building cool in tropical regions. Because passive solar design incorporates both energy conservation and the use of renewable resources, it examplifies the twin energy strategies with the most potential in the decades ahead.

Knowledgeable observers predict that the next decade will see some of the most rapid and far-reaching architectural changes in history. As a pioneering solar architect noted in 1980, "traditionally, architecture has been a response to the times, and energy conservation is the issue of our time." Passive solar buildings are already catching on in many industrial countries, particularly the United States where over 60,000 have been built since the early seventies. So far there is very little activity in the Third world, but the long-run potential there is equally large. Buildings are a growing part of the energy problem in most countries, and improving designs today would greatly enhance the comfort and economic appeal of the world's building well into the next century.

In this age of standardized buildings and mechanical heating and cooling systems, it is easy to forget that passive solar design was once the norm. In some parts of the world, it still is. Built without the aid of architects or engineers, many traditional buildings make clever use of sunlight and natural convection for heating and cooling. Over 2,000 years ago Socrates observed that "In houses that look toward the south, the sun penetrates the portico in winter, while in summer the path of the sun is right over our heads and above the roof so there is shade". This basic idea-that the sun describes a lower and more southernly arc in winter than in summer (a more northernly one in the southern hemisphere-is applicable everywhere but near the equator). Two to three times more sunlight strikes a south-facing wall in winter than in summer, making it the logical side for windows.

As Ken Butti and John Perlin point out in their history of solar architecture, A Golden Thread, the Greeks were among the earliest passive solar designers. Many of their buildings were oriented to the south and had thick adobe or stone walls that kept out the summer heat. Passive solar heating was also employed by the Romans. By the fourth century A.D., the pressure of firewood scarcity had become a strong incentive for solar heating, and Roman architects slowly adapted solar design to the various conditions found throughtout the Roman Empire. Access to the sun was actually made a legal right under the Justinian Code of Law adopted in the sixth century A.D.

In other cultures other climate-sensitive building styles prevailed. Most homes in ancient China were built on the north side of courtyards, facing south, and sunlight was admitted through wood lattice windows and rice paper. Even today, millions of passive solar houses are found throughout northern China. The Anasazi people of the American Southwest lived in mud or stone buildings constructed against overhanging cliffs that faced south. Solar-heated in the winter and shaded in the summer, these earth-sheltered dwellings were built without benefit of modern builing materials or theories. In northern Spain many apartment buildings built in the nineteenth century have glass-enclosed south-facing balconies called galerias that provide effective solar heating.

The world over, traditional architecture also incorporates simple passive cooling techniques. Throughout tropical Asia and South America, open-sided pole and thatch buildings allow ample ventilation and protection from the heat which rivals fiberglass as an insulator, is also found atop mud and straw buildings in sub-Saharan Africa. For thousands of years in Moslem Asia, cooling towers have been used to draw air into buildings, providing ventilation and relief from the hot summer climate.

Since the onset of the Industrial Revolution and the urban migration that accompanied it, many traditional architectural forms have been abandoned. Climate-sensitive building designs were not easily adapted to cities, and standardized architectural styles took over as the need for low-cost housing grew. Architect Richard Stein writes that "during the 1920s many of the most prophetic and influential architects projected the form of the future as being freed from the rigorous demands of the climate and orientation."

This revolt against nature combined with growing populations more that tripled the fuel requirements of buildings worldwide between 1950 and 1980. New buildings use much more energy per square foot than those of the past since they have energy-intensive central heating and air-conditioning systems. Furthermore, only half the residential buildings in Europe, for instance, have any insulation at all, and storm windows are a rarity. In the United States close to one-third of the residential housing stock is uninsulated, and another 50percent is underinsulated. The buildings in many countries, particularly the homes of the poor, are loosely constructed and "Leaky" : Cracks around windows and in walls and attics set too much heat out and in.

Turning our backs on climate-sensitive design and construction techniques has proved costly. Consider the typical modern office building. With glass facades and mechanical "climate-control" systems in use every day of the year, its energy appetite is enormous. Commonly, a quarter of an acre of lights must be turned on to illuminate a few square feet surrounding a desk.

In private houses and apartments the rapid spread of air conditioning has upped energy use more than any other factor in recent years. Together, residential and commercial buildings account for between 20 and 40 percent of national energy use in most industrial countries. Of this energy, approximately four-fifths is used to heat, cool, and light buildings and the rest runs water heaters and other appliances.

Building for the Future

worldwide, there are now over 100,000 passive solar buildings, over half of them in the U.S. The U.S. department of Energy's goal is to have a half million climatesensitive buildings standing by 1986, and the National Association of Home Builders expects to see passive solar systems in 30 percent of all new houses by the year 2000. And even these arguably conservative figures, based on current growth rates, a reasonable worldwide target is to have 10 million passive solar buildings in place by 1990 and between 50 and 100 million by 2000. By the and of the century most countries should aim to use energy saving designs in all new buildings.

Unfortunately, measuring the precise energy contribution of climate-sensitive design is difficult. Since a solar building does not produce a fuel that can be measured by a meter, it makes more sense to calculate the amount of additional heating and cooling fuel that would have been used by a comparable conventional building. Yet conservation and solar technologies are fused so tightly in a good climate sensitive building that solar collection gains and conservation gains are hard to distinguish.

Even without the benefit of precise measures, it can be estimated that constructing new passive solar buildings will save at least half of the fuel currently used to heat and cool similar structures. If a Baltimore house's energy use is taken as the average, that means that 10 million solar buildings in 1990 would in effect yield 0.7 exajoules of energy or enough to run all of the cars in Canada for over six months. Fifty to 100 million passive solar buildings by the century's end would yield 3.7 to 7.3 exajoules or 6to 12 percent of the energy currently used to heat, cool and light the world's buildings. Together, climate-sensitive design for new buildingsand conservation measures for existing stuctures should reduce the fuel needs of the wold's buildings by 25 percent by the turn of the century, despite substantial growth in the housing stock.

The potential of passive solar architecture is no longer in doubt. Nor are the benefits of more rational design and construction for people at all income levels and in all climates. We can learn something from the architecture of the ancients. As one solar designer recently observed," our buildings would be more beautiful if they responded to energy concerns and had a more natural configuration,"

THE MIGHTY MOSQUITO

Malaria and Kala-azar

In the 1950s and 1960s when DDT was thought to be all powerful, the Government hoped to eradicate malaria within 8-10 years. By pumping in enormous funds for malaria control—more than 50 per cent of the health buget—it was argued that malaria could be controlled. Although there have been allegations that UN agencies like WHO and FAO were pushed to encourage malaria control programmes by salesmen of pesticide companies, malaria incidence and deaths did come down dramatically in India from some 100 million cases in 1952 to about 100,000 in 1965. And indeed the malaria eradication programme was probably the only disease control programme that actually reached every doorstep in the country.

Moreover, the control of malaria in the Terai region for instance, played an important part in opening up many areas for agriculture. The euphoria went so far that the scientists even stopped research work on malaria and the name of the malaria Institute of India was changed to the National Institute of Communicable Diseases.

The dramatic resurgence of malaria in the 1970 shattered these dreams. By 1976, malaria cases in India had once again surged up to 6.4 million. Though this rising tendency in malaria cases has now been arrested, the total number of cases still remains over two million each year.

Admitting the defeat of the malaria control strategy at the hands of the lowly mosquito, WHO's director general said in no uncertain terms : "I am being brutally frank. This time we are not going to fool ourselves. In Africa, for instance, the most we may be able to do is to ensure that every one who has an attack of malaria can go and pick up some tablets to cure it."

In India too, the increase in malaria incidence has been controlled to a great extent through a massive dumping operation of the anti-malaria drug, cholroquine. It is available in every village either through community health workers or special malaria pill depots. Anybody with a fever can take these pills to cure themselves, a practice called "presumptive treatment". If the fever persists, then it indicates that the person is suffering from some other disease. Pesticide spraying programmes, which were almost discontinued by the late 1960s, have also been taken up in a big way.

Malignant Malaria

Another alarming problem, besides the spread of insecticides resistance in mosquitoes, is the increasing resistance to chloroquine of the most dangerous form of malaria, *Plasmodium falciparum*, also known as malignant malaria. *Plasmodium falciparum* kills 40 per cent of its victims if they go untreated. Resistance of the malaria parasite to chloroquine is a phenomenon already widespread in Asia and Latin America. In Asia, Chloroquine resistance was first noted in the early 1960s in Thailand. But since then it has spread westwards, being first noted in northeastern India in 1973. Now however, cholroquine resistance is found widely in Nagaland, Assam, Meghalaya, Arunachal Pradesh and Mizoram and has spread slowly to Bihar, West Bengal, Orissa, Andhra Pradesh, Madhya Pradesh, Maharashtra, Mirzapur district of Uttar Pradesh and areas bordering the north of Delhi.

Concerned by this dramatic spread of drug-resistant *Plasmodium falciparum*, the Indian Council of Medical Research has set up a series of surveillance centres in the northeast to keep a watch on the disease. The spread of drug-resistant malaria. in fact, is the reason why deaths from malaria continued to rise during the late 1970s, even though the incidence of malaria case has fallen.

Fcw cheap alternatives

The absence of a cheap and safe alternative to chloroquine poses a big problem. Except for the US Army, which became interested in malaria because of the US involvement in Vitnam war (where malaria caused more US casualties than the Vietcong), virtually no one else has initiated the screening of drugs for their anti-malaria properties. Since 1964, the Walter Reed Army Research Institute in the US has screened more than 250,000 compounds. Of these, only seven drugs have been found to be effective in humans. These drugs include mefloquine, claimed to be the most potent drug found against malaria uptil now. But mefloquine is expensive and the cost of mass distribution could be prohibitively high.

WHO has launched a major research paogramme on mefloquine, including efforts to reduce its cost of production. But as this is being done in collaboration with multinational companies, whether the drug will be available eventually at a low price is doubtful. Moreover, experiments on rodents conducted at the Liverpool University's School of Tropical Medicine have shown clearly that with time mefloquine too can lose its effectiveness against the malaria parasite. Professor peter Wallace of the school points out: "The more sophisticated and purer the chemicals we develop, and more specific the activities for which we design them, so the easier it becomes for the targets at which we are aiming to evade these very potent substances."

Fortunately, in India the most prevalent form of malaria is not *Plasmodium falciparum* but *Plasmodium vivax*, which has not yet shown any signs of resistance to choloroquine. This is the basis of the massive malaria treatment programme going on in the country at the moment. But inevitably resistance must come into it as well.

Yet another problem before malaria control today is the loss of interest in the pesticides industry for developing effective, cheaper and safer insecticides for public health use. The big market for pesticides has never been in public health as it has always been in agriculture and within agriculture in cash crops like cotton. With growing resistance and cross-resistance amongst vectors, the effective life of a new pesticide is often only a few years. Profit from a new product is thus limited and hence the industry is not interested. The number of insecticides offered to WHO for field-testing for use in public health operations has virtually dropped to Zero.

What do malaria control experts do in these circumstances? With the resurgence of malaria, it is now universally accepted that a switch will have to be made from exclusive reliance on chemicals-based malaria control programmes, to multipronged malaria control programmes consisting of complicated mixtures of chemicals, environmental and biological control techniques.

Knowledge about biological vector control is limited and its use even more so. In China, a large variety of biological control measures are already used against mosquitoes but in India they are largely in the research stage. Moreover, growing evidence indicates that biological techniques can only work as ancillaries to chemicals, not as replacement.

An effective malaria vaccine, too, is still not developed and no expert really believes that it will be powerful enough to make mosquito control redundant. It may in fact turn out to be a rather weak vaccine. Most vaccines produced uptil now are against viruses and bacteria.

Before DDT came into existence, countries controlled malaria by destroying mosquito breeding habitats. It is to such habitat management that they will probably have to turn again. These measures usually have multiple effects, bringing about simultaneously a reduction in several other diseases. But modern anti-malaria programmes have neglected source reduction work because it is more complex than simple DDT spraying, community-based organisations are necessary and hence results are slow, and it costs more.

Such efforts, however, may be unavoidable. Habitat managemer is vital in all rice-growing areas, for instance, as rice culture creates favourable conditions for breeding of mosquitoes. Intermittent flooding of rice fields has been made compulsory by law in Portugal as a means of malaria control. In Mexico where rice is planted in trenches *Anopheles pseudopunctipennis* can be almost totally eliminated by induced water flow which sweeps away the larvae resting on the water surface. Raising of edible fish such as carp in paddy fields is quite common in China. But such strategies have to be identified specifically for each species; this involves research in vector biology, apart from the enormous efforts required to reach individual farmers and involve them in mosquito-control programmes.

An Integrated Approach

Professor V. Ramalingaswami's call for an integrated approach to development projects is underlined by several reports which indicate that new developments may be making malaria conditions worse. The Malaria Research Centre's intensive study of the Terai region shows how changing ecology and human migrations can dramatically change its disease pattern. Because of malaria control efforts in the 1960s, the Terai region was not considered endemic for malaria for a long time. The region is agriculturally important to the country and, therefore, has high priority in malaria control efforts. Now the incidence of malaria is high and the vector, Anopheles culicifacies, is resistant to both DDT and BHC. Irrigation water constitutes the main breeding site. The population of Culex mosquitoes, which spread filariasis, is also very high. Mosquito surveys shows that their numbers almost always exceeded that of malaria—spreading Anophelines.

Labour for agriculture in the Terai region has come from eastern Uttar Pradesh which is endemic for filariasis. The reservoir of infection in the immigrant labour has made the Terai region also endemic for filari asis now.

(*Contd. on page 24*)

WINDOW TO THE WORLD

Low Cost Brick Making Machine

Low cost brick making machine has recently been developed by Pactra Services Pvt Ltd., Australia, to meet the requirements of small scale industry. The unit uses the economic dry press method to manufacture high quality bricks and floor tiles. This process involves less firing time and it does not require any drying areas or sheds as the bricks have a low moisture content. The machine provides trouble—free operations under arduous conditions. A diesel generator provides the power source for grinding the raw material and pressing up to 1,200 bricks an hour. Operation can be continued on a 24-hour schedule with minimum maintenance. This machinery is designed as a modular unit which can be transported very easily. Standard bricks produced by this machine have high strength, are suitable for structural work and have a quality finish for face brick work.

(*Source : Technonet Asia Newsletter, July 82*)

Production of Particle Board from Agro-Wastes

Particle board is a versatile wood-based panel which can be produced from wood, the secondary and plantation wood species and agricultural wastes. These ingredients are mixed with a bonding agent and flat pressed by heat and pressure. The sources of fibrous raw materials come from any one or a combination of (A) wood waste from sawmills, furniture factories, plywood factories, (B) round logs such as secondary wood species, plantation wood species, (c) agricultural wastes like rice, hulls, bamboo bagasse, coconut trunk, etc. The bonding agent like urea formaldehyde, phenol formaldehyde, urea melamine formaldehyde together with a suitable catalyst and buffer, wax, water and other additives, are employed in the production process.

Snake Soup ?

"The menu of the future may contain such unlikely items as snake soup, stewed bat, alligator eggs, vegetables mixed with ants eggs, or even barbecued ricefield rat. The Nutrition Centre of the Philippines and the University of the Philippines College of Home Economics are currently making *a survey of alternative foods* which they say are both nutritious and delicious.

The researchers believe that self-sufficiency in food means not only making maximum use of the usual foods, but also implies adoption of non-conventional foods to supplement or complement traditional dishes. The project has so far identified 521 local foods that could be papularised in the hope of promoting greater consumer acceptance. Of these, 367 are plants, the rest are animals (including bats, wild cats, deer, horses, monkey, ricefild rats, alligators, snakes, turtles, frogs, and tadpoles) and insects."

(IDRC Feature, August-Septmber 1982).

Animal Feed

"Straw treated with caustic soda and mixed with urea and mineral solution can produce high quality animal feed at low cost, according to a report in the University News, of Sidney, Australia. The report says oat straw makes the best feed, but adds that straw from wheat and other crops can also be used. Dr Roy Kellaway, of University of Sidney's Animal Husbandry Department, estimates that Australian farmers burn about 30 million tonnes of "waste" straw residue annually. This could provide enough feed for 87 million sheep or 11 million cattle for an entire year."

(IDRC Feature, June 1982)

(*Source : Technonet Asia Newsletter, July 83*)

Ferrocement Biogas Digester & Fish Culture

The Asian Institute of Technology, Bangkok (Thailand) under its integrated biogas technology (IBT) programme has successfully experimented using slurry oozing out of the biogas plant as food for the fish in ponds. Four ferrocement low cost biogas digesters of 3-5 cum. size with a few modifications were used for this experiment. The Report says that the IBT can be beneficial, in many ways because the human animal and vegetable wastes are stabilised by the anaerobic fermentation process in the digester with the production of biogas and the slurry which, if applied at appropriate loading to fish ponds, will result in photosynthetic production of algae which will serve as food for herbivorus fish.

(*Source : Biogas Newsletter No. V*)

Earthworm raising is becoming a big business in many countries, and in the Phillipines worm growers have recently formed their own association to encourage increased production. There are good reasons for the interest in the wriggly creatures that no less an authority than Charles Darwin once claimed have played 'so important a part in the history of the world.' Earthworms are prolific, relatively easy to raise (the proper term is vermiculture), and have many uses in agriculture, aquaculture, nutrition, and even medicine. The earthworm contains about 70 percent crude pretein, plus amino acids, and makes a good substitute for fishmeal or bonemeal in animal feeds. It consumes almost any kind of organic garbage, converting it to worm castings that are rich in nitrates, phosphates, and potash, and make excellent fertilizer. Dried and powdered, earthworms could also be used in making everyday food such as bread cookies, and noodles. Japan, one of the world's biggest earthworm consuming countries, reportedly uses them in a whole range o fproduct that includes antibiotics and aphrodisiacs".

Palm Oil Diesel :

Brazil which already dilutes much of its gasoline with fuel alcohol from sugar cane, in now looking into the possibilities of growing its own diesel fuel too.

"Vegetable oils such as soybean, rapeseod, and peanut, can all be converted to make diesel oil. But the most likely contender for Brazil's 'diesel plantations' is *palm oil*. It has been shown to produce close to 2 tonnes par hectare—about nine time more than soybean or peanut.

"The palm has other advantages, It grows well in poor soils, and it can be harvested year round, thus providing both steady work and regular production.

The Mighty Mosquito

(*Contd. from page 22*)

The culex *tritaeniorhynchus* and culex *vishnui* group of mosquitoes also breed abundantly and extensively in rice fields and other irrigation waters. High densities of these mosquitoes can be found resting and feeding inside structures throughout the Terai region. The region has, therefore, became vulnerable also to various viral diseases that these mosquitoes can spread, including the killer disease Japanese Encephalitis.

Similarly, a study from Tamil Nadu shows how the Sathanur Reservoir has become a major cause for malaria increase in that State. Villages along the course of the south Ponnaiyar River, which passes through three district Salem, Dharmpuri and North Arcot, appear to contain the main foci for malaria in the State. An estimated, 57.5 per cent of the rural malaria cases in Tamil Nadu were reported from this region in 1976. The Sathanur Reservoir and its vicinity alone accounted for nearly 51 per cent of the reported cases of rural malaria in this state. The incidence of malaria is not found in a continuous stretch, but in patches along the banks of the Ponnaiyar River especially downstream from the reservoir. The heaviest concentrations of malaria have been found in villages situated within 5 km of the river. Most of these riverside villages were free from malaria for nearly 20 years.

All the reasons for the reappearance of malaria are not known. Occurrence in patches is apparently due to changing ecological conditions in these stretches because of the introduction of a canal irrigation system completed in 1958. Prior to the canal, water for irrigation had been funnelled through channels, and storage was limited to small tanks. There was little water flow in the river except during the monsoon months.

Several malaria experts now argue that mosquito-borne diseases could not be controlled because while the disease pathogen and the carrier mosquitoes were tackled, little attention was given to people. Only if habits of people and their projects are suitably modified can mosquito-borne diseases be controlled.

Thus, if headway is to be made in the control of some of the major communicable diseases, including malaria, social anthropologists, health educators, communications experts and engineers will have to become partners with medical practitioners. In Europe and the United-States, radical changes in social habits and living conditions followed economic development. These changes played a great part in eradicating insect-transmitted diseases long before the new insecticides and post-war drugs became readily available. Leading authorities on malaria are now convinced that malaria eradication will be linked up with the general socioeconomic development of the developing countries.

No country need wait, however, until that happens. The experiences of China and North Vietnam show that with mass education and people's participation in mosquito habitat control measures, and government projects taking environment into consideration, substantial success can be achieved in controlling mosquito borne diseases Vietnamese experts describe malaria as a "social disease" and stress that "no medical organisation, however large and complete, can lead the fight against malaria to a successful conclusion, if the masses do not adopt its programmme."

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PRESENT AND ESTIMATED FUTURE WORLD USE OF NEW AND RENEWABLE SOURCES OF ENREGY

Source	Present use in billion (10⁹) KWh	Utilization in the year 2000 in in billion (10⁹)KWh
Solar	2-3	2,000-5,000
Geothermal	55	1,000-5,000
Wind	2	1,000-5,000
Tidal	0.4	30-60
Wave	0	10
Thermal gradient of the sea	0	1,000
Biomass	550-700	2,000-5,000
Fuelwood	10,000-12,000	15,000-20,000
Charcoal	1,000	2,000-5,000
Peat	20	1,000
Draught animals	30 (in India)	1,000
Oil shale	15	500
Tar sands	130	1,000
Hydropower	1,500	3,000

(source : United Nations A/CONF. 100/PC/17)

points to ponder

50 million Accidents

Although the accident frequency rate in the industrialised world has levelled out, the rate of fatal accidents in developing countries has doubled or even tripled. The increase, according to the International Labour Organisation (ILO), is largely attributable to 'the negative effects of transfer of technology.'

It estimates that there are some 50 million work-related accidents every year—that's 160,000 every day – many of which result in permanent disability : a heavy price for the developing world to pay for its rush to World industrial and agricultural development.

(From IRDC Reports.)

Food Supply Worsens in 22 African Countries

More than 150 million people in Africa could soon face hunger and malnutrition on a "massive scale", according to the Food and Agriculture Organization (FAO). This Director-General of the organization, Mr Edouard Saouma, speaking on 19 October to representatives of the 22 affected states, 25 donor countries and other agencies, called for urgent and concerted action to "avert a worse catastrophe in these countries in the coming months".

Reports showed a compounding food crisis in southern, western and eastern Africa resulting from natural and man-made causes.

Over-Emphasis on Doctors one Reason for Slow Progress in Health

Over-emphasis on doctors may be one of the main factors holding back progress in the health of poor countries. This is a major point of the World Health Organization's "Progress in Primary Health Care : A Situation Report", just released.

Bringing together information from 70 countries containing 64 per cent of world population, the report notes that "manpower consumes between 60 and 80 per cent of the health budget in many countries".

(UN Weekly Newsletter)

DRUG ADDICTION

Country	*Per capita drug consumption*	*Drug consumption as % of GNP*
Developed Nations	15.86 $	0.2 to 1.7
India	1.2 $ (Rs. 14/-)	0.92
Rural India	0.03 $ (Rs. 0.32)	Not Available.
Other developing countries.	4.18 $	0.1 — 1.1

* 3% of total budget is allocated for health and family welfare in India.

* Expenditure on Drugs :
Developing countries—40-60 % of total health care
Developed countries—10-20 % of total care

* 20% of the population uses drugs in India (mostly in urban areas).

* India has 5156 licensed drug manufactures.

* 25,000 different formulations exist in India, where as in developed countries it is below 3000.

* Only around 250 drugs are considered essential by WHO.

* In India roughiy 10% of all formulations are vitamins.

* Drug imports for 1980-81 was Rs. 112.8 crores.
Most of the imports are life saving drugs. More vitamins except vitamin A, B and Nicotinic acid amide are still imported. Top five largest selling drugs in India of one brand (turn over in Rupees) (Crores) are :

Sulfa Methaxozale and trimethoprim	11.32
B-complex preparation	7.8
Tetracycline	6.88
Streptomycin	5.82
Analgin	4.63

(Source : Nutrition News, Sep. 83)

Editor's viewpoint

The Destination and Steps

Though the destiny of the humankind is so much linked with the way it relates the modes of fulfilment of its requirements, with the planet's various natural resources, systems and cycles about which man's knowledge is vastly increased, the way short range narrow interests prevail in the economy of the day, is very disturbing. Straws of Greed, avarice, the aggrandisement and competition in human character are not the right guides in formulation of policies regarding how the knowledge gained of science is to be utilized. The days of laissez faire are long gone. Things now cannot be allowed to run as per whims and fancies of the individual selfishness—be it of a man, a group of people or a nation. The more powerful and speedy a vehicle the more strong and accurate is to be its braking system. And so is to be its steering, the controls of direction. What is creating great insecurity in the ethos of the human thinking and behaviour at this juncture of history is the fact that the fearsome gap between the power of science and the control man has over its utilization. The objective truths of science have got to be used by equally objective [illegible] dispassionate hands. As application of science is technology—the latter too should be scientific—which it is presently not. The new age of the maturity of our scientific era can be possible only if the above trends are corrected, otherwise the very instruments of scientific knowledge which have the great potentialities of full flowing of the human spirit and bring heaven on earth will lead us to our annihilation.

The deadly missiles positioned by confronting world powers ready to explode a large part of the world to smitherines are not the cause but the effect of the total misutilization of science and technology. It is an index of the end result towards which science without morality or spirituality leads to. The ship of human existence is heavily laden with destructive goods—the number and destructive power of which, as if, doubles daily. The awareness of this danger is dawning fast but the steps to avoid it are tardy and relatively insignificant. If we want that atomic war heads be dismantled and '3.1 million dollar per minute' expenditure on arms stopped the consumerist competetive trade and industry with profit as the only motive will have to be gradually dismantled & redesigned. To do this the beginning can be made by every individual in changing his own life style and value systems from unscientific to scientific. Whatever we think, communicate or act must have the breadth of time and space that the framework of speed and span of the situation requires. We cannot afford to be narrow in attitudes when the circumstances demand otherwise. The scientific life of man will therefore be such where the use of all the knowledge and power, that has been leant to his head and hand, is dictated by the good of life on earth for not only today but also of the future. Every unit of matter, energy space and time has to be rightly utilized in that direction. What we consume for our needs has to be produced in a way that it fulfils the laws of natural balances. The way we produce things to fulfil human needs should also lead to progressively greater peace of mind.

As 1984 dawns and the 21st century remains only 16 years far, the deepening crisis of human destiny demands from us with a strong commitment to development of peace and justice to our ranks and express, exert and assist our convictions in actions.

When we look round, we find forces of kindred spirit in all directions—let all these ripples be joined into a wave which can sweep human consciousness into their right direction.

Devendra Kumar

Published by Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, Maharashtra, and
Printed at Swatantra Bharat Press, Esplanade Road, Delhi-110006.

SCIENCE FOR VILLAGES

FD-36 (~~204~~)

ding a Bridge between the Science Lab and the Village Mudhut

APR 1984
C.F.T.R.I., MYSORE

No. 77 February 1984, Monthly, Annual Subscription : Rs. 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

Every country like every individual has some special contribution to make in this world. It is the uniqueness of the individuality of nations that makes the progress of the human civilization possible. This area of uniqueness is determined by factors of geography and climate, history and culture, etc. India's uniqueness lies in the fact that though it is a country of villages (78% of its population still lives in its villages) it has a well developed city civilization with its urban complexes of industry and commerce, science and technology etc., and where the rural urban economies could be made complimentary.

While the affluent nations have an industrial base with a very small percentage of people working on land and the Third World poor nations are mainly agricultural, we have both the industrial-technological acumen as well as a large rural base. Even if it be by numbers, we are third in the world in numerical strength of scientific personnel. This gives us and us alone, the power as well as the space to manouver a new course to the economic order of the world. This is an economy where the harmony between Nature and Man could be restored, conflict between the individual and collective interests of people and nations made complimentary and peace be brought about in the outer and inner life of Man. All these three areas of peace between (a) man, the component and Nature, the whole, (b) individual, the component, the community, the whole and (c) the physical, the component and the spiritual the whole; are put to great strain as the tempo of physical production and consumption at all levels gains ground with the technological advancement of the age. With time these strains on the global fabric are getting more and more critical. It is being fast realized that the solution lies in an economy of ecological balances, conservation of non-renewable mineral resources, more and more self expression and psychological satisfaction in all human endeavours, economic equality and social justice and closer human contact with each other and the living Nature surrounding us. For this new concepts are being propounded, literature put up, deliberations continued and small ripples of movements manifested in the world over. Ivan Illich has called it as the emergence of a new continent of knowledge. This new phenomenon, however is submerged in the current competitive industrial megalomaniac race. Under these sombre circumstances, India, not having yet been completely misshaped in this mould, has a hopeful area of experimentation to evolve the new model where science and technology can be directed to deliver the desired results.

Here lies the responsibility of Indian Scientists to take up this great challenge of the age of Gandhi & Einstein. Gandhi had invited the scientists of his day as advisers to the All India Village Industries Association, he had formed, to see that the scientific community takes up the responsibility of Indian villages, which he said

(*Contd. on page 16*)

from the labs

Indian Hand Moulding Table for Bricks : The Central Building Research Institute, Roorkee, has come out with an improved hand moulding table for building bricks. This was prompted by the need to have more uniform bricks in view of the lack of skilled moulders for small-scale production.

The device consists of a wooden table to which a metallic wood mould is fixed. The mould is provided with a movable bottom plate centrally attached to a vertical ejector shaft. The top edge of the mould projects about 5 mm above the table top. A frog is fixed to the base plate immediately above which a false bottom plate, with its centre cut out to accommodate the frog, is loosely fitted.

A vertical shaft is actuated by a foot-operated lever mechanism so that when the pedal is pressed down, the base plate is pushed up to level with the top edge of the mould. On releasing the pedal, the base plate drops down to rest on 4 corner blocks, the position of which is also adjustable. The total linear shrinkage of the clay to be used must be predetermined to fix the dimensions of the mould box and the depth of the loose base plate from the top edge of the mould.

(*Asia-Pacific Technology Digest*)

New Solar Boiler : A senior draftsman of the Southern Railway, Madras, has designed a solar boiler based on the principle of heat propagation by convection. The boiler is basically elliptical in shape with one end flattened for easy positioning. The outer sphere, made of aluminium, has its outer surface blackened to absorb solar radiation. The inner sphere is made of suitable refractory material to prevent heat conduction. A heat exchanger is provided inside the boiler connecting the top and the bottom of the inside sphere by means of a metallic tube. The heat is conducted to the water in between the spheres. The heated water in between goes to the top and then to the heat exchanger. The heat is transferred to the water to be heated and finally reaches the bottom. In repeated cycles of this process, the temperature of the water can be raised substantially.

(*Statesman, 24-12-83*)

A Miracle Fertiliser (BGA): Blue green algae (BGA) is a natural fertiliser and can save the country Rs. 300 crores every paddy season. It is widely used in Vietnam and China in rice fields. It provides an alternative source of nitrogen for rice cultivation. Algae is essentially a water plant capable of fixing nitrogen in soil. They absorb nitrogen from the air and convert organic matter in the soil into valuable nutrient. IARI has found that BGA can provide 15 kg of nitrogen per hectare. With 10 kg. algal culture costing Rs. 30 in 1 hectare an extra yield of paddy worth Rs. 700 can be obtained.

Farmers can produce BGA at the cost of Rs. 7 per 10 kg. of material. A simple pit is made. Ten kg of soil mixed with 200 of ammonium super phosphate is placed in this pit and the pit is filled with about 5 inches of water. Starter culture packets are sold by IA
for Rs. 2.50 each. Pit is exposed
sun. In summer a thick algal m
can be obtained within a wee
Water should be evaporated a
dried. Algae flakes can be store
for long in bags. It should b
applied at the rate of 10 kg. p
hectare one week after transplantation. BGA goes on adding nitrog
to the soil.

(*Voluntary Actio
Vol. 25, No. 3, Oct. 198*

Rural Industrialization...
(Contd. from Page 3)

returns should be assessed. Fo
example goat or pig may yiel
greater profits than other animals
But if energy is also to be accounted, a mix of buffalo and goat ma
prove optimal. Studies are neede
to determine the optimal mix. So
also soil and water management is
important.

This leads to my 'onion peel' theory—systematic studies may
give a clue what optimal blend of
plants, animals and people can stay
on an hectare of land getting the
maximum returns from all these
resources in the best interests of the
people.

It is high technologies like biotechnology/genetic engineering, micro electronics, satellite communication etc. that offer high promise to serve the needs of the rural poor. High intellectual inputs should be coupled with a good delivery system to reach the people and to bring the fruits of Science to the doors of the people that need it.

We are told agriculture is for food and forestry is for wood. Thinking anew is the need of the day.

RURAL INDUSTRIALIZATION

—*Dr. Y. Nayudamma*

(The author, former Director-General of CSIR in this article, specially written far SFV at our request. puts forward a new approach to rural techniques-Editor)

The goal of any country is development. Development is development of people—their increased living standards and improved quality of life. Industry provides goods, services and material comforts to increase living standards. Social values such as human dignity, self-reliance and gainful employment for every person set the quality of life.

Such development can only come by generating, mobilizing and optimally utilizing natural and human resources, native genius and skills and maximising the returns for the same.

Majority of the people live in rural areas. The question then arises as how to maximise the returns, let us say, for a hectare of land. On land, we have soil, water, forest or agricultural crop, animals and people—under a given climate. How to maximise the returns for these resources is the issue.

How to grow more crops, get better yields is one aspect : Soil-water management, better seeds, fertilisers, pesticides and farming techniques, etc., have given good results. But these involve high energy inputs. The emerging technologies like tissue culture, genetic engineering etc. offer great promise.

Past experience has clearly shown that rural industrialisation is not setting up large industries in rural areas. We are also fed with the opiate that rural development is synonymous with agricultural development. True, rural people live on land and agricultural development is a must. But it is not enough. Agriculture should have a nexus with industry. In food crops, the proportion of agricultural residues to the food obtained for human consumption is approximately 1.5 to 1 for roots and tubers; 2 to 1 for cereal grains: 6 to 1 for oilseeds and 10 to 1 for sugar crops. This biomass should be viewed as an asset and utilized effectively as a raw material for food, fodder, fertilizer, fuel, building materials, chemieals, etc. This aspect has not received the attention it deserves.

Leaf to Root concept advocates that every part of the agricultural plant must become a raw material for industries. For example several industries may be set up around paddy plant. Straw may be used for making card boards, wrapping paper, roof thatch; bed for mushrooms, apart from animal fodder. Paddy husk may be used as fuel and the resultant ash for producing sodium silicate, solar grade silica, silica sol, ceramic materials and refractories and cement like products. It can also be used for making particle board, activated carbon, furfural, fillers and extenders, fire resistant composition, paddy husk bricks, for mulching, soil reclamation and as a filler in fertilizer industry and animal feed. Rice bran is extracted for oil for edible and non-edible purposes like soaps, detergents, paints, etc. The deoiled rice bran contains 20-22% protein and used as animal fodder. Rice as such is used for food and several food products for use in beer, wine and several starch based industries.

Similarly 25 industries could be started around sugarcane; 7-12 industries around cotton, groundnut etc. Same could be said of forest plants. Setting up a cluster of industries around each forest or agricultural crop plant would mean, stabilising the prices for farm produce against the vagaries of weather and international markets; leads to decentralised industries in rural areas where the bulk produce is, fetching better returns to the farmer; his savings reinvested in the industries right in front of him ; additional gainful employment to rural people and bring city comforts to the villagers instead of the villagers going to city slums This would also mean rural urban continuum instead of rural urban conflicts.

Similar to crops, utilization of every part of the animal dead or slaughtered and to increase the yield of milk or meat should be given due consideration. Further, amongst the animals cow, buffalo, goat, sheep and pig—the animal or a mix of animals that give the maximum

(*Contd. on page 2*)

DOES NUCLEAR POWER COST THE EARTH?

Nuclear power's economic viability has steadily eroded during the past decade, according to a study released today by Worldwatch Institute. Cost overruns, slower growth in electricity use and financial uncertainties will severely restrict nuclear power's future.

"The real cost of nuclear power has risen in every country for which reliable data are available", said Christopher Flavin, author of the report, *Nuclear Power : The Market Test*. "In the past ten years, nuclear construction costs have risen 60 per cent in France, more than doubled in West Germany and more than tripled in the United States. In only a few nations are new nuclear plants a less expensive power source than new coal plants. Nowhere is nuclear power now economical compared to improved energy efficiency."

Cost overruns can be traced to technical problems left unresolved in the haste to commercialize nuclear power, according to Flavin, a Senior Researcher at the Washington-based organisation. More sophisticated designs and additional materials and labour were continually introduced to improve safety. Chronic inefficiency has also become characteristic of many nuclear industries.

"The 30-odd U.S. nuclear plants completed in the mid-eighties will generate electricity that costs 65 per cent more than that from new coal-fired plants and 25 percent more than oil-fired power. The construction bills for these plants will average over 2 billion, or five to ten times their original budgets. If all the electricity used by Americans costs as much as this nuclear electricity, the nations' utility bills would more than double".

Nuclear cost increases have been almost as severe in Great Britain, Japan and West Germany, according to the report. But the higher cost of coal in these countries leaves nuclear power competitive with coal-fired power. In the Soviet Union the latest Five-Year Plan reports that nuclear plants are 80 to 100 per cent more expensive to build than coal plants.

France has the best national record for cost control. The study said that standardized designs, the centralization of the industry and the squelching of political opposition have streamlined nuclear development, keeping nuclear power less expensive than coal-fired power. But E. Flavin cautioned that because most French plants are quite new, "it is too early to judge long-term economic or safety performance.".

"The major economic assessments on which today's nuclear power programmes are based are riddled with errors," the report said. "In the nuclear business, the line between serious analysis and industry propaganda is frequently blurred, and policy makers still lack a full and fair accounting of nuclear power's economic status".

Eighty-seven U.S. nuclear plants were cancelled between 1975 and November 1983, with a net loss in future generating capacity sufficient to meet the electricity needs of any country except the Soviet Union and the United States. All plants ordered in the past decade have been cancelled or mothballed, and the U.S. nuclear industry survives only on pre-1974 orders.

"Although the bulk of the cancellations are now past, some of the worst financial crises lie ahead", the author warned. "The burden of multi-billion dollar construction projects has driven the Washington Public Power Supply System into default and threatens several other utilities. Many Wall Street analysts warn investors to avoid utilities with heavy commitment to nuclear projects. Already U.S. utilities have cancelled plants in which over $10 billion had been invested".

The world is now using less than half as much nuclear power as was projected a decade ago. The global commitment to nuclear power has declined by 31,000 megawatts since 1978. The nuclear programs of Brazil, Iran, Mexico, Spain and Sweden have been cut heavily for combinations of economic and political reasons. In contrast, the nuclear program of France, Japan and Eastern Europe have expanded, though not as rapidly as expected in the Seventies. The nuclear commitments of Canada and West Germany have grown only slightly.

Mounting debt burdens speeded the collapse of some of the Third

World's most ambitious nuclear power programs. The study found that developing countries will have at most 20,000 megawatts of nuclear capacity by 1990, or one-seventh as much as projected a decade ago. Technical complexity and high capital costs make nuclear projects a risky choice for developing countries. Nuclear power was oversold, according to Flavin, and is unlikely to meet a significant share of Third World energy needs in the forseeable future.

The eighties are shaping up as a disastrous decade for nuclear power, and the world's nuclear industries are already feeling the pain, the report said. Even France has decided to order few additional plants in the next several year. The world's nuclear companies face a period of drought that could force many out of the business.

"The question is not whether to make minor adjustments to encourage a thriving industry but whether to introduce fundamental changes in order to prop up a dying business", Flavin noted. "Nuclear technologies would have to be substantially redesigned to compete effectively. Individual nations will have to decide whether such efforts are worth the substantial cost".

"Once nuclear power is protected from market forces, the process becomes complex and insidious, Flavin said. "Efforts to make nuclear power economical could in some nations require major institutional changes that would limit the rights of citizens. Energy efficiency programs and renewable energy projects have been slow to develop in countries where utility planning is run by 'technocrats' and where entrepreneurs and citizen groups play no role".

Nuclear power has been a major economic disappointment, and its special status, apart from all other energy sources, is no longer justified, the study concluded. What the nuclear industry needs most is a good dose of market discipline, Flavin urged. Incentives for cost control must be built into the nuclear industry so that builders bear the burden of their mistakes and profits are made only when promised cost goals are reached.

"Adequate power at the lowest feasible price is the most sensible overall goal, with an accounting of the environmental and safety risks associated with each energy source. Nuclear power may not pass this market test, but if not, it will be replaced by more appropriate energy sources."

(*World Watch Institute*)

FOR MORE INFORMATION
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David Macgregor

Worldwatch Institute
1776, Massachusetts Avenue,
N.W., Washington, D. C.-20036,
U.S.A.

राष्ट्रीय प्रयोगशालाओं को गरीब की झोंपड़ी से जोड़ने वाली हिन्दी की द्वैमासिक पत्रिका

ग्रामोपयोगी विज्ञान

हमारी राष्ट्ररूपी श्रंखला की सबसे कमजोर कड़ी है हमारे गांव। जंज़ीर की मजबूती उसकी सबसे कमजोर कड़ी में होती है। आइए, इस कड़ी को दृढ़ बनाने में हमारा सहयोग करे—'ग्रामोपयोगी विज्ञान' पढ़कर।

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ALTERNATIVE NOBEL PRIZE

Renewable energy pioneers Amory and Hunter Lovins, the traditional High Chief of the Pacific Palau islands and a Chilean economist share the 1983 Right Livelihood Prize of 350,000 Swedish Kronor.

The annual prize was introduced four years ago by a Swedish-German, Jakob von Uexkull, who sold his valuable postage stamps to fund it. It is presented in Stockholm on December 9th, the day before the Nobel Prize ceremony to "honour and support those working on practical solutions to the real problems facing us today".

The winners of this year's Award are :

— Amory and Hunter Lovins (U.S.A.) who have shown that energy conservation and the use of "soft" renewable and decentralised energy resources is not only ecologically desirable but also makes economic sense.

— High Chief Ibedul of Palau (Belau), a small pacific nation under U.S. Trusteeship, struggling to uphold their constitution declaring Palau nuclear-free despite massive U.S. opposition.

— Manfred Max-Neef, a "barefoot economist", working in Latin America to show that positive changes can be brought about at the local level with meagre resources and very little outside support.

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MAIZE SHELLER

Description :

Corn or maize takes lot of time to be shelled as women in India use their bare hands to twist the corn out of the cob which is a painful and time-consuming activity. This is where ahand-operated maize sheller comes into the picture. Using it 120 Kilograms of maize per hour can be shelled by just one woman. Construction material are obtainable locally and at low cost. Building it requires one carpenter using hand tools.

• Construction :

Corn sheller is a hand-operated machine constituting a solid wooden wheel, 60 cm. in diameter, on the side of which 150 fencing staples have been nailed. Adjacent to the wheel is a wooden shute along which the cobs are fed to a spring loaded pressure plate which holds the cobs against the stapled side of the rotaring wheel (see diagrams)

Process :

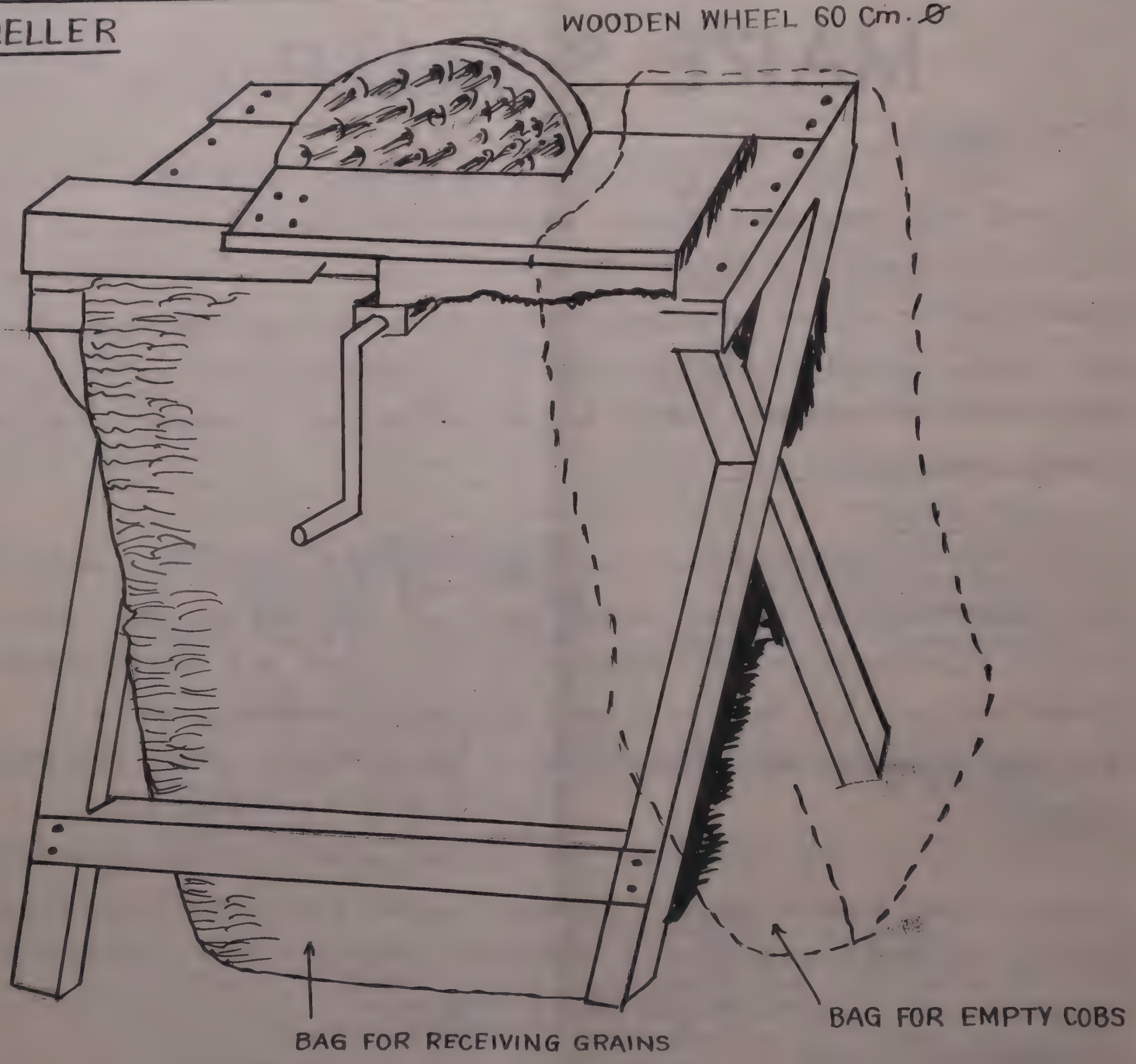
The action of the stapled wheel, turned by a hand-crank made from 1:24 Cm. diameter water pipe, shells the maize kernels from the cob into a receptacle placed below. The shelled cob is automatically ejected out. (see diagrams).

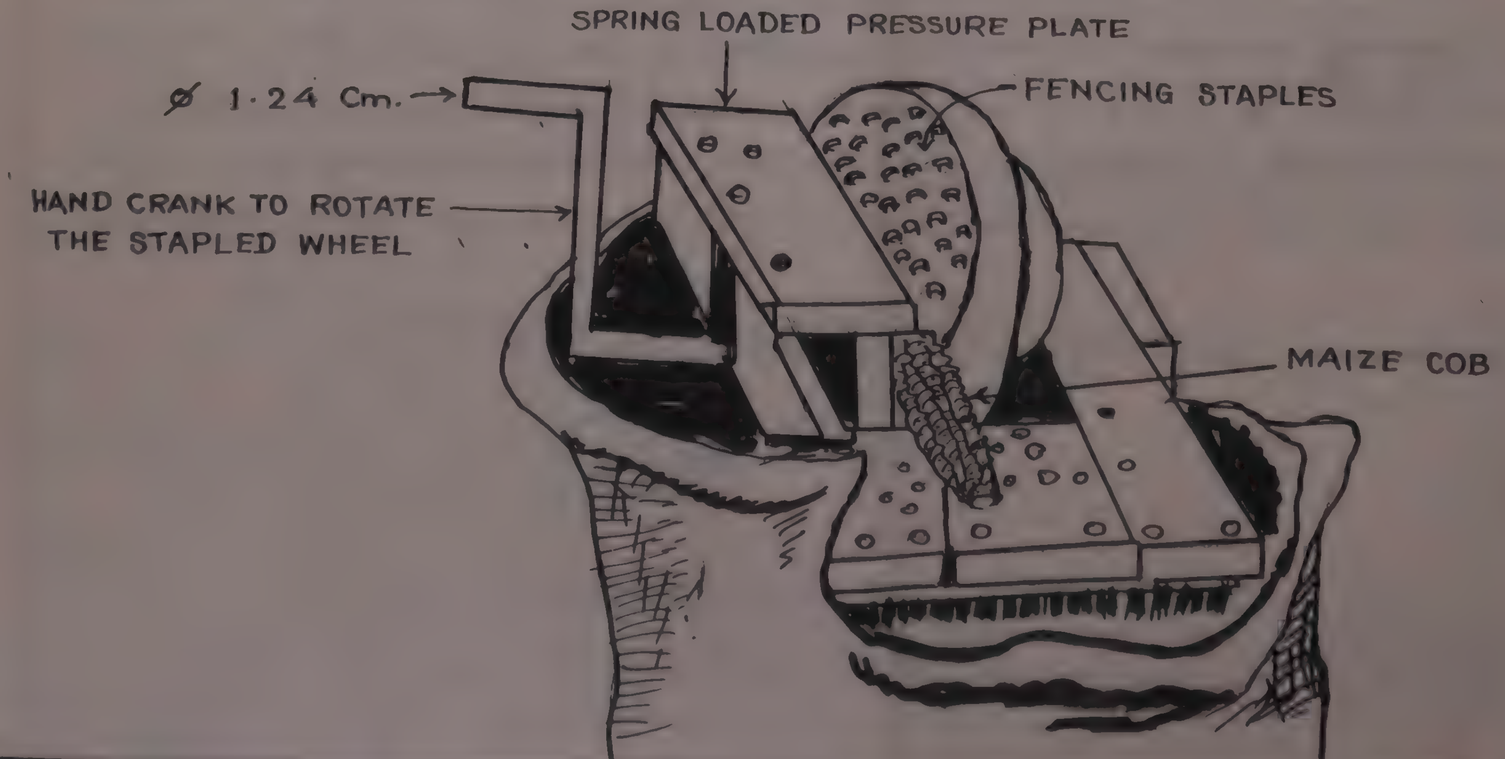
Precautions :

As the only moving piece on the machine is the wheel, its bearing blocks may require replacement from time to time. The side of the shute is liable to be worn out by the action of the wheel if it is not aligned correctly and protected. Moreover, the machine itself should last for considerable time if constructed and handled properly.

Approximate Price Range : Rs. 250 - Rs. 300

MAIZE SHELLER


WOODEN WHEEL 60 Cm. Ø
BAG FOR EMPTY COBS
BAG FOR RECEIVING GRAINS


SPRING LOADED PRESSURE PLATE
Ø 1·24 Cm.
FENCING STAPLES
HAND CRANK TO ROTATE THE STAPLED WHEEL
MAIZE COB

PADDY THRESHER

Description : Paddy threshing is a drushing is a drudgery as carried out in the traditional manner of beating the plants with the seeds against wood. This pedal operated dehusker promises to lessen the burden as in this the womam operates a pedal up and down withone foot and feeds paddy in to the dehusker which is more efficient and easy in operation as shown. in Fig. 2.

Construction :

It consists of a wooden drum like rotor of 25 cm. diameter and 45 cm. length on which spikes are fixed with distances of 5 Cm. between them. For this two rounds of 2 cm. thick wood of 25 cm. diameter are taken and a hole is drilled at their centres and iron collars fitted through which an axle passes. 15 pieces of wood of 2 Cm. thickness 4 Cm. breadth and 45 Cm. length are taken and 10 Cm. long nails are hammered through them at the distances of 5 Cm. to give spikes of 8 Cm. length. These planks are screwed around the two circles to make the spiked drum. In the axle of the drum is the attachment of the toothed wheel of the rear cycle wheel and a cycle chain passes over it. One end of this chain is attached to a rubber band and other end to the pedal plank as shown in Fig. 1

Process :

When the pedal is pushed down the chain pulls the sprocket down making the roller rotate. The rubber tubing brings the pedal back into the original position. With a continued up and down motion of the pedal with the right foot, the roller rotates speedily. Now take some paddy and bring it in the range of the fast rotating nails, holding (as shown in diagram) it at safe distance in both hands. the paddy will be threshed and fall forward.

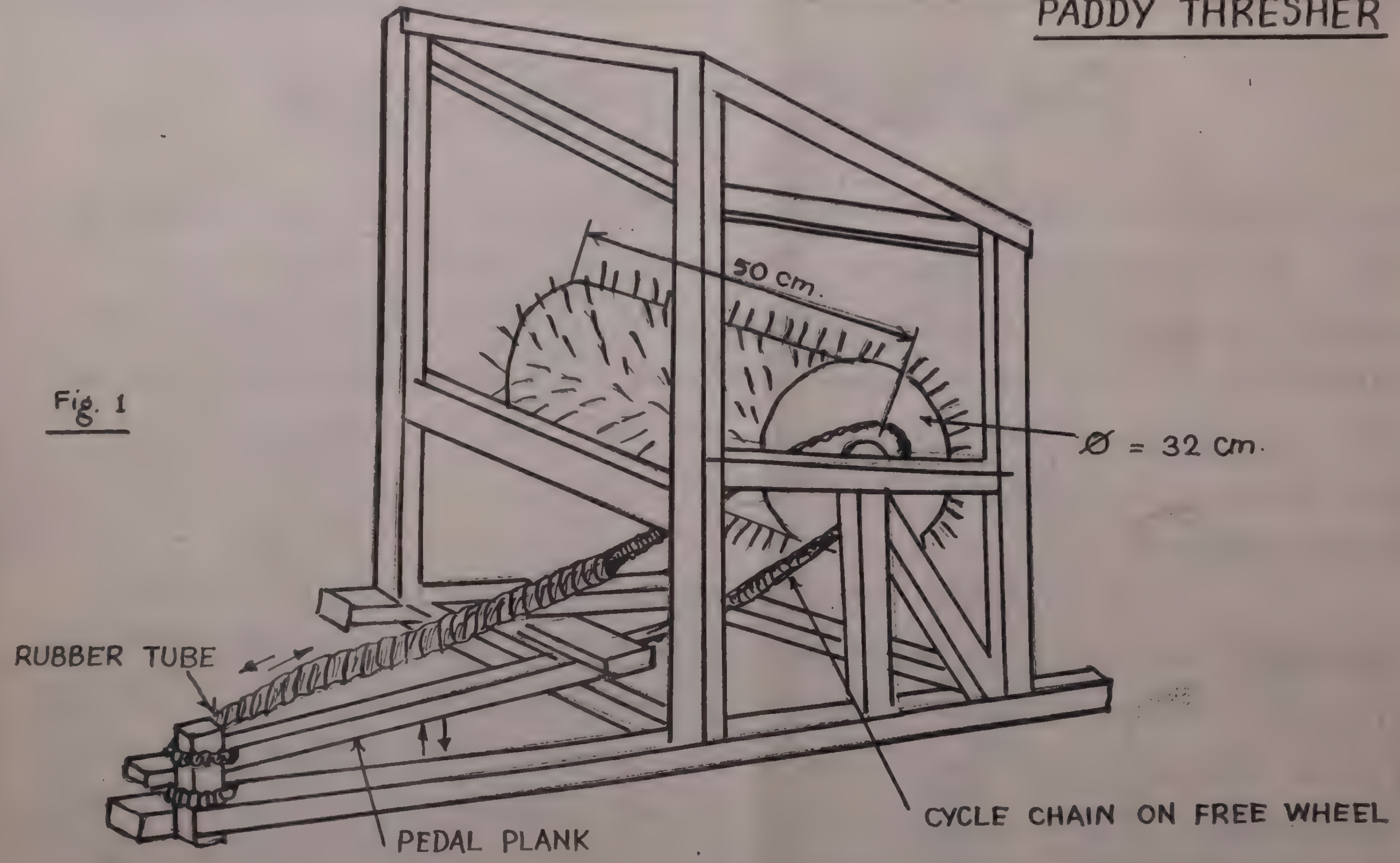
Approximate Price Range : Rs.300- 400.

SOURCE

Dian Desa
JI. KALIURANG KM-7
P.O. BOX 19
BULAKSMUR, YOGYAKARTA
INDONESIA.

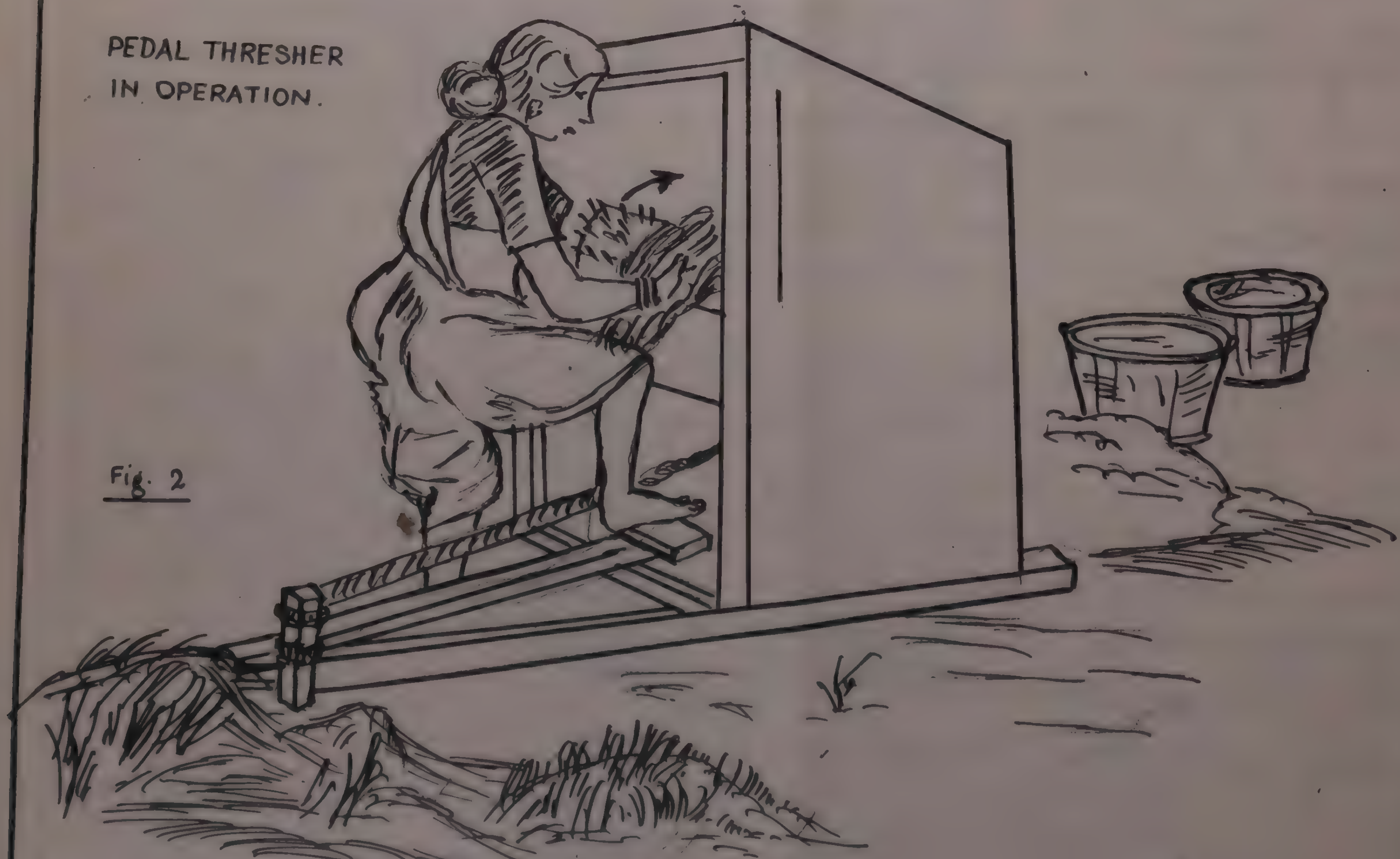
PADDY THRESHER

Fig. 1


50 cm.
Ø = 32 cm.
RUBBER TUBE
PEDAL PLANK
CYCLE CHAIN ON FREE WHEEL

PEDAL THRESHER IN OPERATION.

Fig. 2



Tulsi : Medicinal Values

—Nochiketa Das

Tulsi as a medicinal plant is known to the world though not as a sacred plant. Owing to its fine aroma, emitted by its oil, it has been variously used in cosmetics and perfumery industries. It is cultivated throughout the greater part of India. This is a glabrous herb having 30 to 90 cm of height and erect stem. The botanical name of this herb is Ocimum basilicum Linn.

Soil and climate : Tulsi thrives best on moderately fertile but well drained loamy or sandy-loam soils. The best soils are those in good physical condition and have good water holding capacity. The water-logged lands must invariably be avoided. The plant is rather susceptible by frost and the crop growth is adversely affected by heavy and continuous rainfall.

Sowing : The best time for sowing this crop in the plains of India is October-November and in the hills, March & April.

Propagation : The crop is raised through seeds, but direct sowing of seeds in the field is not advised. The usual practice is to raise the seedlings in the nursery first and then transplant them in the field.

Irrigation : When raised as a kharif crop, irrigation is required once every week. With the onset of monsoon, the rains fulfil the water requirements of the crop till September. Thereafter, irrigation may be required once or twice a month.

Fertiliser : Although this crop grows well under normal conditions, for good growth and yield, it requires application of fertilisers. It is advisable to apply 20 kgs. Nitrogen, 40 kg. Phosphorus and 40 kg. Potash per hectare, as basal dose, before planting. 40 Kg. Nitrogen should also be applied as top dressing, in two equal split doses.

Interculture : It requires intensive care of weeding in order to get good foliage yield. Earthing of the plants is preferable.

Harvesting & Yield : The crop is harvested when the plant is in full bloom and the lower leaves tend to turn yellowish. For medicinal use, any part of the crop can be harvested anytime, as and when required. On an average, 30-35 quintals of green foliage yield can be obtained in two harvests.

Uses : Oil of Tulsi is extensively used for flavouring confectionery and other baked goods, sauces, tomato pastes, pickles, vinegars, spiced meat and beverages. It is used for secting dental and oral preparations and in certain perfumes. It also has some insecticidal and insect-repellent properties and is effective against housefly and mosquito.

Fresh Tulsi juice checks vomiting and destroys the intestinal worms. A man who has lost consciousness, being struck with thunder or by being seriously poisoned by snake bite, should be fed with the juice of its leaves. If the Tulsi root is held in the arm, there is no fear of thunder. Powder of the root rubbed slightly on a scorpion bite will give relief from pain. A decoction of the plant is considered as a stimulant and as a cure for gas pains. The same preparation can be used as a wash for external ulcers. The decoction of roots and leaves is used as a lotion to alleviate rheumatic pains and paralysis.

The decoction of leaves are commonly used to cure stomach aches, fevers, cough, insect-bites, ring worms, earaches, difficulties in hearing and delayed menstruations.

The application of Tulsi leaf Juice (green or powdered) has shown positive results towards the cure of the following diseases :—

(a) Arthritis, Osteorthritis and muscular pain. (b) Sinusitis and cold. (c) Kidney diseases i.e. oliguria and oedema. (d) Leucoderma. (e) Blood cholesterol (f) Acidity (g) Dysentery and colitis (h) Specific and chronic headache (i) Cold, cough, rhinorrhoea, diarrhea, vomiting, etc. (in the case of children) (j) Heart disease and (k) Fever, malaria, etc; etc.

Moreover by adding jaggery, cardamom, etc. with Tulsi leaf juice, it can be taken as tea (Tulsi tea) which prevents the body from many ailments.

(*Source :* VILLAGE VIEWS)

Seethaphal : Some Uses

—A. Jagadeesh

Annona Squamosa (*Seethaphal*) grows wildly under a variety of environmental conditions. The fruit has many seeds. The seed of the fruit yield 21 to 29% oil. The characteristics of the oil are :

Sp. Gr. at 15°C	0.92116
N 60°D	1.4558
Sapohification value	181 to 183.3
Iodine number	85.6 to 88.2
R.M. Value	0.6
Poplenske value	0.2
Unsaponification matter	0.2%

The oil contains the following percentages of acids:

Oleic	18.1
Linoleic	55.1
Palmitic	14.7
Stearic	10.7
Cerotic	00.9

These acids are used in the preparation of :

Oleic acid :—Soap base, manufacture of oleates, ointments, cosmetics, polishing compound, Lubricants, One floatation, Organic synthetic intermediate, surface coatings.

Linoleic acid :—Soaps, special driers for protective coatings, emulsifying agents, medicine, foods, feeds, biochemical research.

Palmitic Acid :—Starting point in the manufacture of various matallic palmitates, soaps, lube oils, water proofing.

Stearic acid :—Chemicals, especially stearates and stearic driers, lubricants, soaps, candles, pharmaceuticals and cosmetics, rubber compounding, shoe and metal polishes, coatings, food packaging.

The oil in general is used in the manufacture of paints and varnishes.

Demand for Edible Oils :

In normal years, the per capita availability of edible oil in the country averages 3.5 Kg. and about 1 Kg. of Vanaspati, as against 25 to 30 Kg. in Western countries. The total requirement of vegetable oils in the country, as of today, is estimated at 40 lakh tonnes, compared to the present availability of 30 lakh tonnes. There is thus a gap of 10 lakh tonnes.

It is estimated that in another three years, the demand would go up to 55 lakh tonnes, while the availability would be around 35 lakh tonnes. The gap would, therefore, widen to 20 lakh tonnes. The reasons for this are not far to seek. The acreage available for oil seeds cultivation would further diminish due to a corresponding increase in the cultivation of rice and wheat, on the one hand, and the faster increase in population on the other. The situation is, therefore, quite alarming.

If this shortfall has to be met by imports, it would mean a foreign exchange drainage of about Rs. 1,000 crores a year as of now, and about Rs. 2,000 crores by three years, We can't afford it at any rate. And, hence need for an alternative. It lies in tapping the entire tree and forest origin seeds-generally known as minor oilseeds-which are now going a waste.

Minor Oils:

To meet the demand of minor oils, Annona Squamosa seed, salseed, mango kernel, neem seed, babul, mahua, kokum, plam, date, nahor, undi, pisa, karanja, kusum seed, jack-fruit seed, bobble, maroti, eurahonne, mahera, rubber seed, ratahjot, tamarind seed, tkamala, dhupa, tea seed, jute seed, obacco seed, khakan etc. may meet the requirement.

Medically Annona Squamosa leaves alongwith turmeric are used to cure 'foot and mouth disease' in rural areas. More over since the leaves of the plant are bitter in nature, cattle won't eat the same.

Technology to Preserves Pulp from Seetaphal :

A process to preserve the pulp in Seetaphal is available with Central Food Technological Research Institute, Mysore. It is as follows ;

The custard apple of eating stage of maturity is cut into halves and the pulp and seeds are scooped out with stainless steel spoons. The pulp and seeds so obtained are passed through a pulping machine fitted with 30 mesh sieve and then through a 60 mesh stainless steel sieve to separate the pulp free of seeds and fibrous matter. The yield of pulp has been found to vary from 20 to 25 per cent of the whole fruit.

The pulp contains about 20% sugar and 0.3% acid as anhydrous citric acid. It is of creamy white colour and has a thick consistency. The pulp, when subjected to heat treatment, develops bitter after-taste thus making the conventional method of preservation by heat impracticable. It also turns pink, when exposed to air, due to peroxidase activity.

To preserve the pulp, it is necessary to raise the sugar concentration to 40% by addition of sugar acidity to 1% citric acid with 0.1% sodium berzoate and 50-100 ppm sulphur dioxide. These are mixed thoroughly and then filled in either crown-corked clean and dry glass bottles or tin containers, both plain and lacquered. When tin containers

(Contd. on page 13)

BOOK WATCHING

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(*Seethal...Contd. from page 12*)

are used, they are vacuum sealed after filing them three-fourth full with pulp.

The product prepated thus has been found to be acceptable when stored at room temperature for six months.

WINDOW TO THE WORLD

THAI PEDAL—POWERED SOY GRINDERS: The Research Institute for Health Sciences (RIHS), of Chaing Mai University, has developed pedal-powered grinders for turning soybean into milk. The design is based on information supplied by the Volunteers in Technical Assistance (VITA).

The successful prototypes developed by the RIHS are already in use. The first one has a flywheel and a 3-pulley drive chain which makes the final shaft rotate 12 times for each revolution of the pedal sprocket. A standard grinder is fixed to the pedal-power assembly.

The second model drives the same standard grinder by a specially designed, lightweight dynapod assembly. Both the models are easy to use and transport, with grinding efficiencies equal to the electric motors they are designed to replace. The low capital outlay and maintenance costs make these models ideal for use. (Asia-Pacific Technology Digest, May-June, 83)

THAI MUSHROOM DRINK: For South-east and East Asia, mushrooms are not viewed as belonging to the domain of the connoisseurs and gourmets but are used as an integral ingredient of the normal day-to-day recipes. Among others, mushrooms provide a good substitute for meat because of their high protein. They are also good for diabetic patients because of their low carbohydrates and for high blood pressure and heart patients because of their cholesterol reducing substances.

Bangkok's Devakan Apothecary Co. has come out with the Shitake Mushroom Beverage. It has a spiky taste and may not be as smooth as tropical fruit drinks or the Western junk drinks that sleek advertisement has succeeded in cultivating the taste for among Asians, but it packs a lot more nutrients that are good for the health. (Technology Digest)

RICE HUSK BURNER: The Standards and Industrial Research Institute of Malaysia (SIRIM) has developed a low-cost rice husk burner as a cheap and efficient alternative to sun-drying, of paddy. The burner consists of a blower, ducting, a 6.2 HP gasoline engine and an indirectly-fired rice husk furnace. The burner is coupled to a holding bin made of plywood and stiffened with wood. The burner's furnace is made of steel. It is provided with a feed regulation device, a rice husk feeder and a shaker to prevent the rice husk from clogging the feeder.

Rice husk falls by gravity from the top of the furnace into the combustion chamber where it heats the tubes continuously. Ambient outside air is heated by the tubes and is then forced through paddy to effect drying. Preliminary test runs indicate that this burner can dry 1 ton of paddy in 6-7 hours depending upon the initial moisture content of paddy. (Technology Digest, October 1983.)

CULTURED CEMENT: A Filipino inventor, Adriano S. Alfonso, has developed cultured cement to overcome drawbacks of the cement like heavy weight and long time to harden.

The cultured cement composition of the present invention consists of 10-30% cement, preferably Portland; 30-60% fillers selected from the group consisting of glass beads, coconut coir rice husk, sugar cane, baggasse and other fibrous material, plastic foam beads, perlite, sand and gravel and mixture, thereof; 1-5% catalyst selected from the group consisting of a 50 to 50 mixture of methyl ethyl keytone and hydrogen peroxide or benzoil peroxide; 1-5% of an 8% solution of cobalt naphthanate (accelerator), 0.63-1% pigment, 5-15% of a water soluble alkyd resin selected from the group consisting of polyester resin or epoxy resin (additive); and 5-25% of water.

It is claimed by the invention that by varying the proportion of various ingredients of cultured cement, it is possible to prepare mixture for use in building foundations, roads, building panels, flat roofs, corrugated roofs, poles and pipes. (Technology Digest).

OIL SUBSTITUTE DEVELOPED: A liquid fuel that could serve as an alternative to oil has been developed by the Government-owned Salzgitter concern. "Densecoal" consists of 70 percent ground coal of specially high heating quality and a chemical additive (0.5 to one per cent) which keeps it liquid and makes it burn as easily as oil. However, it causes less pollution than oil—it gives off a much smaller percentage of nitric oxide, sulphur and ash and is odourless, non-poisonous and non-explosive. Dense coalcan be stored and shipped by tankers in the same way as oil. Furnaces operating on oil could easily be run on the new fuel. (The Hindustan Times).

points to ponder

HEALTH FOR ALL: In the game of life and death many people are playing against the odds: one in two never see a trained health worker; one in three are without clean water to drink; one in four have an inadequate diet. The result is millions of premature deaths every year. Three-quarters of health budgets are spent on doctors and hospitals providing curative care for a small minority. Three-quarters of world disease is preventable through primary health care. Providing primary health care would cost an extra $ 50 billion a year for the next 20 years: two-thirds of world spending on cigarettes; half of world spending on alcohol; one-fifteenth of world military spending. (New Internationalist).

DO YOU KNOW

WATER: 70% of India's Rural Population has no access to safe drinking water. Out of this 160 million people spread over 200,000 'Problem' villages face an acute scarcity of drinking water according to the latest Government data.

WATER-BORNE DISEASES: Two-thirds of all illnesses in India are related to water-borne diseases such as typhoid, jaundice, diarrhoea, dysentery and cholera. This results in economic loss of Rs. 200 crores a year in rural areas because of loss of work days and productivity. (Health for the Millions)

50% LAND AFFECTED BY ENVIRONMENTAL PROBLEMS: More than half of the country's land area is affected with environmental problems due to heavy deforestation, water-logging, salinity of water, shifting cultivation, etc. It has become one of the vital threats to the economic progress.

Cities are becoming gas chambers due to increase in layer of CO_2 and SO_2 due to industrialisation and continuous flow of rural population to cities because of increased employment opportunities causing various forms of pollution (air, water, noise, etc.)
(Statesman)

INDIAN WOMEN - HEALTH STATUS IN THE CONTEXT OF SOCIAL DEVELOPMENT: It is stated that an average Indian woman becomes pregnant 8 times and gives birth to 6 to 7 children, of which 4 to 6 children live. The infant is breastfed for at least two years or until the arrival of the next child. Out of 30 years of reproductive life, she spends 16 years in pregnancy and lactation. And 140 million malnourished women support this vast industry. Ten to 20% of all maternal deaths are due to nutritional anaemia recorded by National Institute of Nutrition. Every alternate pregnant women in the third trimester of pregnancy is anaemic. The maternal mortality rate in India is still an unbelievable 418 per 100,000 (it is as high as 680 in the rural areas).

In advanced countries, this level has fallen below 20. Even countries like Sri Lanka and the Philippines have reduced their maternal mortality rate levels to less than 300. (Gramin Mahiti, No. 1).

TOWARDS OPTIMISM: Throughout history, man's supposed limitations have given way before the power of the human imaginations, the ability of the human intellect to conceive of and do what was never been done before. But even an optimist has need of a philosophy to propel him through times of discouragement and uncertainty. Pessimism and cynicism stem from a sense of hopelessness and helplessness, and human being have never been helpless. The transient failures that have marked history reflect periods of philosophical poverty. But given a transcendent vision, people have proved themselves capable of uniting across their differences to continue the steady human advance, particularly when it is clear that their destinies are interlocked.

The oncoming generations will have to operate in a world arena; be at home in many lands, among many peoples; comprehend many philosophies and psychologies; and be open to approaches as yet uncharted. They will need an intense awareness of the conditions under which the values essential to the future of mankind can be created and maintained. They will need living examples of the conspiracy of love so essential to man's salvation. Man cannot safely ignore the life force at the centre of his being and the fact that his security lies not in transforming nature but in transforming himself, and that it is impossible to talk about the necessary formation without using the word "Love".

Perhaps we should arrange for more encounters with people who have discovered that "happiness is not external to man", that it is a living force within man that wants liberating. Civilization gets its basic energy not from its resources, but from its hopes. The tragedy of life is not death, but what we let die inside us while we live.

—Norman Cousins

(*Contd. from page 1*)

carried the nation in their wombs. Centre of Science for Villages which I represent, is a continuation of the same urge from the same place. I had the privilege of joining Gandhiji in this field in 1946 when as a young scientist, I was asked to work in the A.I.V.I.A. research laboratory at Wardha and with Dr. J. C. Kumarappa I then visited the various labs of Nagpur—the Science College, the L.I.T. and the Agriculture College. My experience during all the years has been that apart from individual exceptions, the response of scientists and technologists in general had not been very encouraging to a decentralized, low energy, low-capital industrial growth concept of Gandhi. But as time has passed I have observed in these three and half decades that with the progressive exhaustion of fossil fuels, which largely was responsible for the economic growth of the age, the progressive accumulation of toxins in the systems, as expressed through ecological imbalanecs and the progressive strains on individuals, society and nations there has been a slow but sure enlightened awareness in the conscience of the scientific community towards their responsibility in this regard. The Stockholm Conference on Environment, Vienna Conference on S & T for Development, the Nairobi Conference on Renewable Energies are not stray incidents. How do we weave these strands to which the world's new thinking is giving expression, in our S & T institutions and the scientific community, is the question today. It is something on which the country has been giving due consideration as you all find in the extracts from Section on S & T in the Sixth Plan.

The DST (Department of Scince & Technology, Govt. of India) is encouraging such efforts and has helped develop this Centre at Wardha to involve the scientists in this change of direction. CSV is a new branch started in 1976 on the old Wardha tree with still very fragile light green leaves budding and the stage of flowering and fruition will still take a long time. It has a small team of a dozen and half scientists of various disciplines working for the last seven years on projects where the results of such researches in the S & T labs of the country, which can bring about improvements of the village life in general and can be translated into giving new avenues of employment to the improverished villages in particular, are being carried out. Such Technology Transfer Centres need to be nurtured and multiplied the country over if we want to fulfil our unique role of finding alternatives to the present system.

Devendra Kumar

I do dimly perceive that whilst everything around me is ever changing, ever dying, there is underlying all that change a living power that is changeless, that holds all together that creates, dissolves and recreates. That informing power or spirit is God. And since nothing else I see merely through the senses can or will persist, He alone is. And is this power benevolent or malevolent? I see it as purely benevolent. For I ean see that in the midst of death life persists, in the midst of untruth truth persists, in the midst of darkness light petsists. Hence I gather that God is Life, Truth, Light. He is Love. He is the supreme Good.

—Mahatma Gnadhi

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Published by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Ediior : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001, Maharashtra, and
Printed at : Swatantra Bharat Press, Esplanade Road, Delhi-110006.

SCIENCE FOR VILLAGES

uilding a Bridge between the Science Lab and the Village Mudhut

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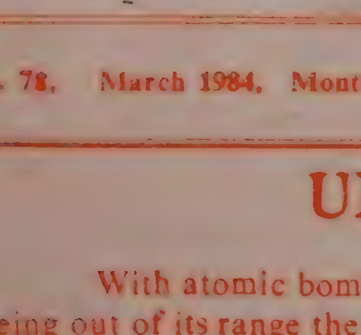
Technology 5 MAY 1984

No. 78, March 1984, Monthly, Annual Subscription : Rs. 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

UNDER THE SHADOW OF FEAR



With atomic bombs stategically poised and aimed all over Eupore and America and no part of the globe being out of its range the world is living in the shadow of the fear of self annihilation. This is no unrealistic phobia, it is a palpably real fact which affects the mind of all people-young and old. The more geopraphically near the people are to this danger the greater is its evidence on their minds. And as things have it, those in technologically advanced countries are under greater threat. One learned professor of human psychology from U.S.A. Robert J. Lifton of Yale, has come to the conclusion that in the present state of helpless impotency against the bomb even from the age of five the child imbibes the fear of bomb psychology which unconsciously revives over the mind of everybody all the time in the Western World. This sword of Democales, in the form of the Atom Bomb hanging on each individual's head does not make one act normally. It threatens not only individual extinction but place the sceptre of ultimate radical futurelessness before the whole humankind-the people, their culture, works and achievements. This leads them to think that what is the need of any permanent and lasting values and all that man is cultivating through generations had held dear. This awesome state of mind has far reaching consequences. It makes people unmindful of the consequences of their actions and tends to make them irresponsible. It also makes many to suppress their fear by drowning themselves in self forgetting activities. The fear of the bomb as expressed above permeates the very fibre of the human psyche. All expressions of the man will therefore be coloured by it. The 'Bomb' is the ultimate result then of the cumulative force that man generated to combat violence with superior violence. And now he stands in awe and fear of the nature of destructive power that has been unleashed. This analysis of the psychological effects : the every presence of this all destroying agent-man has created-may be highly exaggerated quantitatively but qualitatively it is correct. It is a very sad state. We must do everything in our power to relieve the mental pressure exerted by the fear of atomic holocaust, which becomes imminent every day as if the fuse has been lit and it is only a matter of time when the big bang takes place. In this state of affairs, where is the climate of working for the weak and the poor and bring equal opportunity to all ? What place is there for the conservation of nature, ecology, environment and long range preservation of the plant and human culture evolved on it ? Who has the equanimity to think of the spiritual content of the unity in diversity and design of the Divine in all that is around ? This sobre scene cannot be wished away. We have to work to change it. We have to see that all bombs are safely defused and rendered harmless, that no further work on atomic explosions is undertaken, nor any country be allowed to have the Bombs and whoever prossesses them is made to give over their custody to the U. N. Probably the invention of the atomic bomb has come about to bring home to man the utter productivity and futility of the means of violence to settle any dispute and to bring in an era of nonviolence and peace, which will have to be built-brick by brick. It should not be misunderstood that the bomb is a freak phenomenon in the steady growth of technology which was otherwise innocuous, for the fact is that all through, scientific inventions have been used for the narrow short range interests of those

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

Hand—Actuated Seed Metering Device : A Simple device has been developed in India to help farmers who sow their seeds by hand achieve an even distribution in the field. It consists of a square-section mild steel pipe, fitted with a spring-loaded lever and a gate to regulate the flow of grains. One end of the metering device is made round in section and connected to a cloth bag by means of a flexible plastic pipe. The cloth bag is filled with seed and is carried by the operator on his back. Seed metering is done by pressing the lever with the thumb (approximately once per second while walking along with the plough. As the lever is spring-loaded only a light action is required to open and close the seed-regulating gate. Where ploughing and sowing is a single-man operation the metering device can be fitted on to the plough handle to make it easier to use. The device can be calibrated for a desired seed rate by adjusting the stroke of the lever, and in field tests the uniformity of wheat crop emergence has been found to be very satisfactory. It can be made by village artisans with their available facilities and requires no experience to use. For further details about the construction of the device please write to N.P.S. Sirohi, Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi—110012, India.

Appropriate Technology
December 1983

Indian Energy Saving Cooking Box : Conservation of every bit of energy has bebome vital in these days of energy shortage. In this context, a simple and cheap cooking box invented by Dr. S. Natarajan of Perarignar Anna University of Technology, Madras, which saves upto 20% LPG/kerosene fuel will be of interest. A country wooden box of 46×46×40 cm size is filled with paddy haystack leaving a central hole of 18cm diameter to accomodate an average size cooking pot. The haystack is packed iight, with 12cm. left unfilled at the top to accomodate a cloth sack (40×35cm) tightly filled with hay. The pot containing water and cooking materials is covered with a plate and heated as usual on the stove to boiling point and then transferred to the cooking box which is closed after the hay sack is placed in position. The meal is slowly cooked by the thermal energy stored in the boiling water.

Fuel from distillery waste : Scientists at the Bio-chemical Engineering Research Centre (BERC) in the Indian Institute of Techology (IIT) New Delhi have indetified yet another and abundant source of bio-gas, the distillery waste. Studies have shown that 45 litres bio-gas containing 75 per cent methane can be produced from each litre of distillery waste. During the process of biogas generation, the liquified effluent-one of the most polluting environmentally unacceptable organic waste ebiological oxygen demand (BOD), which is an index of water pollution is reduced from 50,000 ppm (parts per million) to 5000 ppm.

Clipp;ng Services Bulletin
Jan. 84

Water Hyacinth 'Useful' : Water hyacinth, the weed generally regarded as a nuisance everywhere, if utilised properly, can be of immense value to man, according to Prof. B.S. Trivedi, a leading botanical scientist. The weed botanically known as Ecichornea Crapesis, can absorb cadmium, a very harmful mineral from water and hence acts as a water depollutant. A recent invention has shown that the weed can be a raw material for high quality paper.

New Liquid Fuel Developed : A liquid fuel that could serve as an alternative to oil has been developed by the government-owned firm. 'Densecoal' consists of 70% ground coal of specially high heating quality and a chemical additive (0.5 to 1%) which keeps it liquid and makes it burn as easily as oil. However, it causes less pollution than oil—it gives off a much smaller percentage of nitric oxide, sulphur and ash and is odourless, non-poisonous and non-explosive.

Clipping Services Bulletin
Dec. 1983

CHOOSE FOOD OR FUEL

Turning to energy crops as a source of automotive fuel opens a new chapter in the history of human efforts to achieve an adequate food supply. For the first time since agriculture began, the world is faced with a potentially massive diversion of agricultural resources to the production of non-food crops. Unfortunately, this is beginning to happen at a time when efforts to expand world food output are losing momentum, when food prices are rising, and when malnutrition is increasing.

Whether the use of cropland to produce fuel for automobiles can be justified is complex issue, one that political leaders will be wrestling with for years to come. Of the many considerations, the most critical one may be difference between the perceived national interest in energy crops of food-surplus countries and that of food-deficit countries.

The attractions of alcohol fuel are clear. For countries buffeted by soaring oil prices and possible supply disruptions, the prospect of an easily available substitute for some of the imported oil is an inviting one. Although, the world's oil reserves are concentrated in a handful of countries, the potential for producing energy crop is as widely diffused as agriculture itself.

There are also some solid environmental reasons to support alcohol fuel : it is clean-burning when used alsone and, when mixed with gasoline, it can substitute for lead as an octane booster. In contrast to the burning of petroleum, liquefiedcoal, or other automotive fuels of fossil origin, alcohol produced from plant materials does not increase the amount of carbon dioxide in the atmosphere, unless of course it leads to an overall reduction in the plant material in the world. In addition, alcohol is a renewable resource, a potentially important component in any effort to create a sustainable economy.

Economically the move toward alcohol is justified by the additional employment it would create. Energy crops production and alcohol distillation are far more labor-intensive then are oil production and refining. And because distilleries are dispersed throughout the countryside, close to their feedstock supplies, they generate industrial as well as on-farm employment in rural areas where unemployment is usually highest. Jobs created in the countryside of the Third World can also help slow the migration to the mushrooming squatter settelments that surrounded so many cities.

These attractions of agriculture-derived alcohol fuel must be set against its potential impact on world food prices. By far the most serious enviromental impact of energy crops will be the additional pressures they put on cropland. The doubling of world food output over the adoption of cropping practices that are resulting in excessive soil erosion. At least one fifth of the world's cropland is now losing topsoil at a rate that is undermining its productivity. With the demand for food projected to double again over the next generations, it will be difficult to lighten the demands on soils and to arrest their long-term deterioration. If, in addition, vast areas are planted to energy crops, the problem will become even more unmanageable.

As the number of distilleries multiplies, the production of energy crops will expand until an economic equlibrium is reached between the price of agricultural commodities used as distillery feedstock and those used for food or feed. In the absence of any governmental limitations on the conversion of agricultural commodities into fuel, the price of oil could eventually set the price of food.

The expanding production of fuel crops will underline the vast disparities in income within and among societies as perhaps nothing else has ever done. Until recently, the average per capita claim on the earth's food-producing resources has not usually varied from the richest to the poorest countries by more than a factor of five to one. With the advent of energy crops, however, the ratio could increase dramatically. In effect, the use of energy crops to fuel automobilies permits the world's affluent to expand greatly their claim on the world's cropland area.

(*Contd. on page 12*)

गरीब की झोंपड़ी और राष्ट्र की आधुनिक विज्ञान-प्रयोगशालाओं के बीच सेतु का काम करने वाली द्वैमासिक पत्रिका—

‘ग्रामोपयोगी विज्ञान’

इस पत्रिका में आपको मिलेगी—

- * देश और विदेश की प्रयोगशालाओं में गांवों के विकास में सहायक होनेवाली खोजें।
- * नई तकनीकों की सचित्र जानकारी जिनको गांव में नये उद्योग और विकास लाने में लागू कर सकें।
- * गांव की समस्यायें और उनके तकनीकी हलों के सफल प्रयोग।
- * विज्ञान के क्षेत्र में ग्रामोपयोगी चिंतन।

वार्षिक शुल्क : 5 रुपये (व्यक्तिगत), 10 रुपये (संस्थागत)
ग्रामोपयोगी विज्ञान केंद्र, मगन संग्रहालय, वर्धा-442001 (महाराष्ट्र)

FORM ‘B’

1.	Title of the Newspaper	Science for Villages
2.	Language (in which it is to be published)	English
3.	Periodicity of the publication	Monthly
	(a) In the case of newspaper other than daily, please state the day (s), dates on which it is to be published.	1st and 2nd of each month
4.	Retail selling price of the newspaper	One Rupee Fifty paise
	(a) If it has only an annul subscription and no retail price, please state the annual subscription.	Fifteen Rupees (INDIVIDUAL) Twentyfive Rupees (INSTITUTION)
5.	Publisher's name	Devendra Kumar
	Nationality	Indian
	Address.	CSV, Magan Sangrahalaya, Wardha-442 001 (M. S.)
6.	Place of Publication (Please given the complete postal address).	Centre of Science For Villages, Wardha—442 001 (M. S.)
7.	Printer's Name	Devendra Kumar
	Nationality	Indian
	Address	CSV, Wardha-442 001 (M. S.)
8.	Name of the printing press where printing is to be conducted and the true and precise description of the premises where the presses is/are installed.	Swatantra Bharat Press, 423, Esplanade Road, Delhi-110 006
9.	Editor's name	Devendra Kumar
	Nationality	Indian
	Address	Centre of Science For Villages, Wardha (M.S.)
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I, Devendra Kumar, declare that I Devendra Kumar am the Printer or Publisher of the newspaper entitled Science for Villages to be printed at Nagpur and published at Wardha and and that particulars in respect of the said newspaper given hereunder are true to the best of my knowledge and belief :

Sd/-**Devendra Kumar**

FIVE RENEWABLE ENERGY SOURCES

Wind : When the wind blows at a speed of nine metres per second (mps) it is theoretically possible to extract 1,000 watts (W) from a device intercepting a square metre of the current of air. If however, the wind blows at only three mps, the power falls to that of a dim electric light bulb-35W. This basic law that power varies as the cube of the wind speed is the prime element in any decision to exploit wind power.

The best places for strong, steady winds are temperate latitudes (40° to 50° N or S) not too far from the sea. Wind speeds also increase with height, so hilltops are favoured sites. Because winds are intermittent, some applications, such as water pumping, are more appropriate than others, such as direct electricity generation.

With over a million wind pumps, in use and several modern designs having operated for long periods, world knowledge of wind pumps is considerable. According to Indian studies a sail mill 10 metres in diameter can irrigate one hectare but would cost perhaps as much as US $ 16,000. Wind energy is now considered to have major potential for small-scale water pumping, for electricity in isolated communities with diesel back-up, and for fuel-saving in large-scale electric grids. Other possibilities showing considerable promise include sail-assisted shipping (a Japanese tanker amortized the cost in two years) and driving pumps in reverse osmosis desalination plants.

Electricity-grid-linked wind generators are receiving large amount of R and D funding. The US is spending $80 million a year and development has been rapid-from a 100 kw, 40 meter diameter machine in 1974 to a 91 metre, 2.5 MW machine built in 1980. The UK Electricity Generating Board accept that up to 20 per cent of national peak demand could be met by wind and, with Sweden and the Netherlands, is seriously investigating off shore sites. Among islands likely to receive wind-generated electricity are St Kitts, St Helena, Hawaii and the Western Isles of Scotland. Cost estimates, assuming mass production of current wind machines, are 3 to 4 cents per KW hour with capital costs like to drop to at US$ 800 per kw by mid 1980s, but Denmark's well know 2 MW Wind machine was built at only US$ 360 per KW. It is accepted that in appropriate areas wind generated electricity is already economic.

Wave: The power of ocean waves has long been clear, especially to sailors and to engineers who attempt to design coastal structures to withstand their incessant pounding. It is thought that 50 trillion kilowatt hours (kwh) a year are available along the half million kilometres of the world's coastline. Unlike harnessing the wind, the world has little knowledge of how to harness the waves ; thus there are presently, either in operation or under construction, a wide array of ingenious devices. The most developed is the International Energy Agency's Japenese air turbine ship which delivers 2 MW to the Japanese grid. Holes cut in the hull of the ship allow pressure variations caused by passing waves to be transmitted to large fans which turn and drive a turbo-generator.

Hovercraft inventor Sir Cristopher Cockerell has tested at sea a flat, hinged raft which bends with the waves driving a hydraulic pump which in turn drives a generator.

A 'nodding duck' developed at the University of Edinburgh is a mathematically sophisticated converter of wave energy to reciprocating motion.

Other devices are based on floating airbags and rotating sub-surface barrels ; seafloor devices responding to varying pressure from the passing waves ; static oscillating water columns and the focussing of waves to raise their height sufficiently to cross a dam. A variant of the last mentioned should be given the go ahead in Mauritius in a scheme that would provide 20 MW at less cost than the alternative diesel. Although the technologies have a long way to go, eventual costs may be somewhat more than coal or nuclear power.

Tide : Tides are caused by the gravitational influence of moon (and to a lesser extent of sun) on the water covering of the Earth. The average tide in the open ocean is less than one metre high and it is only in certain shelving bays and estuaries that the twice daily tide is accentuated to useable heights.

Two of the best areas, La Rance in France and Kislaya Guba in the Soviet Union, have already been developed and two others, the Bay of Funday in Nova Scotia and the Severn Estuary in the UK are being considered. In these, tidal ranges are up to 16 metres.

Modern techniques may render lesser tidal ranges exploitable, possibly those as low as three metres. Thus many more parts of the world may show potential.

The principle is simple : a bay is dammed and the tide race concentrated through turbines-ideally, both on its way in and on its way out. Electricity output falls to zero at high and low tide, but dividing the basin into two allows for continuous production. Unfortunately, such projects are expensive and slow to build.

However, less ambitious schemes are possible : tidal mills after all date back to ancient Egypt. A closely related possibility is the exploitation of tidal and river currents. A four knot current produces four kw for every square metre of cross section. The technology does not exist at present. Underwater "windmills" would need to be developed. They may prove economic for inland communities and riparin populations on large rivers such as the Nile, Niger, Euphrates, Indus and Yukon. One estimate is US$ 10 million for a 10 MW rotor.

Ocean : Ocean Thermal Eneegy Conversion is a technology that is likely to be exploited on a very large scale in tropical seas. It explo- the small temperature difference between sun-heated surface waters and the cold water depth of 1,000 metres or more.

One typical scheme uses liquid ammonia cooled with water from the ocean depths. It is pumped to the surface to a heat exchanger warmed by surface water. At this temperature it boils to a vapour which drives an electricity generating turbine. The vapour is then condensed by exposing it, through another heat exchanger, to the cold of the ocean depths. Forty years ago a working plant in cuba generated 22 kw for some years until destroyed in a hurricane. It was built by a Frenchman, and France maintains a deep interest in the concept. The US operates the largest current plant with a capacity of 50 kw in Hawaii. Total US R and D has already reached $ 100 million.

The major attraction is that the available resource base is very large (virtually all the tropical oceans). In addition the technology is relatively simple and running costs look likely to be low. Problem are likely to be related to the necessarily large scale of any installation. Other problems include the size and costliness of heat exchangers, the effect of corrosion on the life of the installation, the risk of damage from storm, the length of transmission lines for the electricity and the capital costs, which are much higher than for coal or nuclear power.

Earth : Geothermal energy comes from nature's own nuclear reactor, It arises ftom the radioactive decay of an isotope of potassium and other elements which are spread about in the earth's crust.

For every kilometre down this generalised heating raises thetemperature 30°C. In some areas geological activity accentuates this effect and temperatures may rise by 80°C per kilometre. Where sandstone and other porous rocks allow groundwater to circulate, heat is transferred to the water which may come to the surface naturally at springs or geysers, or may be obtained by drilling, However, since weight of the rocks makes the crust impermeable deeper than four kilometres, geothermal steam is rarely hotter than 300°C, limiting efficiency. The water and steam are often corrosive and are difficult to use in conventional turbines. New designs may overcome this difficulty.

When geothermal energy provides merely hot water it is used for space heating and agriculture, or to preheat water in conventional steam generating power plants. Italy pioneered geothermal exploitation for its electrified rail system, New Zealand, Iceland, France and Japan apply geothermal energy to space heating. The African Rift and Pacific Basin rim are other favoured areas.

There are great hopes for hydrofracturing hot dry rocks which are far more sidely distributed than porous rock geothermal fields. Water is pumped down one hole, through the fractured rock and back up another hole. The main problem is how long before the hot rocks cool (they take a very long time to heat up again). Current geothermal electricity costs are competitive with nuclear and oil powered stations. (*United Nations*)

BIOGAS : THE INDIAN SCENE

Biogas, a mixture of methane 55-65%, carbon dioxide 30-40% and other impurities is produced during decomposition of animal, plant and human wastes. It can be used directly for cooking reducing the demand for firewood. Moreover, the material from which biogas is produced retains its nutrient value and can be used as fertilizer. The raw materials for generation of the gas that can be considered as a good substrate for the bioconversion process should process the following characteristics : (i) Proper carbon to nitrogen (C/N) ratio; (ii) Appropriate volatile-solid concentration; and (iii) Particle size as small as possible.

Biogas can be produced by digestion, pyrolysis or hydro-gasification. Digestion is a biological process that occurs in the absence of oxygen and in the presence of anaerobic organisms at ambient pressures and temperatures of 35-70 degrees centigrade.

The digester plays a vital role in the gas yield besides the raw meterials and must be properly designed. Digesters for biogas were first known only in India as early as 1900. Somehow the use of the gas did not receive any encouragement in the past in the country while many others picked up this technology quite rapidly. Whereas about 80,000 biogas plants exist in India, there are about 12 million plants in China. The Khadi and Village Industries Commission (KVIC) has been popularising biogas technology for several years. The (KVIC) design consists of a fermentation pit and floating drum for gas collection. Generally, the pit is deep and narrow but at places where the water-table is low, the design is to be modified and the volume taken horizontally. The drum is metallic and takes away about 40% of the total cost of the plant. Besides, if not properly maintained, it corrodes soon and the life of the plants is reduced. Perhaps the initial cost and maintenance factors have dampened the enthusiasm of the prospective users. However, the construction is quite simple and the gas comes out with a constant pressure.

KVIC has experimented with a number of materials including plastics for dome construction. Some cost reduction is possible if the gas holder is constructed of ferrocement. The Structural Engineering Research Centre, Roorkee, has developed ferrocement gasholders. These are very heavy as their scale increases and their manufacture needs skill and proper curing.

IIT, Madras, has developed a modified Chinese type biogas plant of 2 m^3 capacity which is working satisfactorily. Work is in progress on the construction of a chain of reactors (digesters) to extract maximum gas out of the slurry. More work on the generation and utilization of the gas is in progress under a project sponsored by the Department of Science and Technology, Government of India.

Application of Science and Technology to Rural Areas (ASTRA) of the Indian Institute of Science, Banglrre, have modified the KVIC design in several important ways. Instead of optimizing the dimension of the gasholder with respect to capital cost, the ASTRA team has optimized the overall plant dimensions. The result is a shallower, broader digester. It is observed that heat lost in biogas system occurs mainly through the gasholder roof. In addition, the lower temperature of water used in the slurry retards gas production perhaps due to shock induced by the charge to the indigenous bacteria. This can reduce potential gas yield by at least 40%. This problem can be solved by maintaining the slurry temperature at the optimum level of 35 degrees centigrade and insulating the drum gasholder. A transparent tent like solar collector is installed on the top of the ASTRA floating gasholder, modified to hold water on top of the drum by extending the side walls beyond the holder roof. Solar heated water is drawn from the collector and mixed with the daily charge of dung. An increase in yield has been observed because of this aditional device.

The digester capacity depends on the type of raw material, quantity available per day and the gas requirerements. If the digesters are designed with more surface area for the growth of bacteria, the gas yield, would increase. For this purpose bamboos kept as a net can be introduced into the digester pit or pebbles can be added.

The bacteria are extremely sensitive to temperature change and hence it is expected that in cold seasons the gas yield is much reduced compared to hotter ones. If the digester is equipped with devices that can automatically take care of maintaining constant temperature, the difference is gas yield would be negligible. (SOURCE : Journal of The Institution of Engineers, India).

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WINDOW TO THE WORLD

British Anaerobic Digester : The Farm Gas Ltd. of Shropshira, UK, has developed anaerobic digesters for the treatment of domestic sewage sludge. The digester is a high-rate, continuously loaded, fully mixed plant operating at about 35°c. It comprises an insulated digester tank, a digester heating system a digester feeding system, gas collection unit and a process control system. The mixing system employs a compressor which recirculates methane through slurry. The gas produced by the digester is essentially methane, 5% of which is used to heat up the digester. The gas produced contains 62% mehane and 35% carbon dioxide. The process is also a slurry treatment process which reduces the smell of manure. The solid residue has good fertilizer value.

Protein-Rich Leaves : Leaves of certain tropical plants-most of which are unknown to many-are found to be a cheap source of high quality protein. Protein concentrates extracted from tropical leaves are not only good food substitutes but they also have higher protein content that legumes, soybeans, peanuts and winged beans, according to a research carried out by Phillippines University students. Leaf Protein Concentrates (LPC) from tropical leaves in powdered form made through the "heat coagulation" method, can provide the necessary protein intake of individuals at the least cost. Through the "heat coagulation" method, toxicity of the leaves is elimniated. This could be a solution to the search for protein substitutes in the Third World in the face of high prices of common protein foods like meat, milk and eggs.

Philippine Paper Briquettes : If you are getting desperate with files taking space, mails that should not be answered or the low price the junk man offers for your old newspapers and if you do not wish to see the junk papers recycled as egg-trays or wrappers, then W. Alejandro of APTECH might just have the answer to your problem. He converts the junk paper into charcoal briquettes. The process is simple. Soak the paper for 8 hours. Note that some newspapers require only 1 hour of soaking and this has more to do with the quality of paper used than with the contents. Then tear chunks of paper large enogh to be pressed by hand into 1-2 inch diameter balls. Once dried, the briquettes are ready for use. A regular 12 page newspaper should make 6-8 briquettes and have fire for 8-12 minutes which is long enough to cook a meal or heat 1 litre of water. Mr Alejandro notes that some files and reports burn better than others but he has no explanation nor does he wish to investigate this further. He simply assures that the briquettes provide a good, clean fire.

Bamboo Biogas Plant : An architect at the Dharan campus in East Nepal has designed, constructed and successfully tested a biogas plant made of bamboo and mud. Bamboo poles are cut into strips to line a hole in the ground three metres deep. This is plastered with mud and the bottom is stamped with a mixture of sand and mud. Lining the inside with a thin plastic sheet. The hole is connected to an inlet and an outlet pipe. For the the dome, a sktleton of bamboo is constructed by bending them over the digester pit. This is coated liberally with mud plaster. To make the dome gas tight, a sheet of PVC is draped over the dome so that it trails half the way down the digester pit as well. The ends of the sheet should be below the lowest level of the slurry inside the pit. Mud, sand and ash is packed over the PVC sheet. Cow-dung is let in from the side; gas is tapped from within the dome by means of a PVC pipe hanging from the roof of the dome.

Pit Type : The most successful digester design, however, is the pit-type digester originally developed in India. A 10-foot deep well is lined with bricks or rocks and then plastered with cement to form a water-tight container. The digester operates on a slurry of cow-dung and water mixed in equal proportions and is capped with a floating gas holder. Pipes on top of the holder or inside the digester supply the gas holder supplying the required gas pressure. Each day, fresh manure, slurry recharges the digester forcing digested effluent out of the other side.

(*The Hindu, 7th Dec-83*)

Stinger Rotor Tiller : Stinger is a new rotor tiller developed in Malaysia. It is powered by a 3.5 hp petrol engine at 3600 rpm. Power is transmitted by V-belts to the chain drive. The cutting width which comes with a single forward speeds is 508 mm wiee. The implement which is suitable for garden and vegetable farming has a field capacity of about 0.10 hectare per hour. Stinger accessories include a single furrow opener and transport wheels. The retail price of this implement which recentlo won a 'New and Improved Product Development Award' from the Feneration of Malaysian Manufacturers is approximately US $420.

(Technology Digest)

points to ponder

New Plantations in 70 M. Hectare Land Suggested: About 70 million hectare of additional land will have to be planted if the country's effective forest cover is to be in the region of 12 per cent, according to the Secretary, Department of Environment. The intensive programme can include planting all available land from villager's fields, community land or by the side of roads and railway tracks. The additional plantation can be of an ‘intensive”. or “captive” nature. “The “captive” plantations are essentially commercial preposition, aimed at meeting the needs of forest-based industry.

Bad Effect of X-Rays on Pregnant Women: Research finding of the Bhabha Atomic Research Centre (BARC) says that X-rays have an adverse effect on the foetus. The child may be a born handicapped, physically or otherwise. The Centre has developed an instrument self ultrasenograph which is administered to find out the health conditions of the foetus,

Revolt from the Centre: Material advances have not ironed out the differences between rich and poor on either the national or international level. Theoretically political development has given everyone a share in government, but. in reality it has made the authities even more defiant. When viewed in terms of the arms race, environmental pollution and ruthless exploitation of natural resources, scientific and technical advances have created greater problems than those they have solved. The welfare state can boast of a growing number of psychological ailments apparently caused by the pattern of society itself......The greater the problems of the community, the greater intolerance grows. Right-wingers talk of a left-wing bias in society; left-wingers of a right-wing bias; and although both sides tend to exaggerate the achievements of the other, extreme attitudes have been far more vigrously championed both inside and outside parliament in recent years. The extremist movements also have their patented solutions to the problems of society. One side says that the bureaucratic state must be dismantled and the public sector reduced. The other side demands nationalization of the means of production. The polls still indicate that the majority of the people are unquestionably alarmed by these views. The fear of any radical solution whether left-or right-wing which might thereaten our well-earned social benefits and bourgeois democracy remains an obstacle to social innovation. The old established parties are leaving inwards towards the center. And this means that the centre is becoming a place where the opposing forces neutralize each other and stick to the time-honoured solutions instead of using it as a starting point for real innovations.

—(*Manas*) *Sept. 1983.*

Blind Children: Ophthalmia neonatorum is a serious eye disease that can strike new borns, usually within the first 28 days of life. The disease is fairly common in developing countries: studies have shown that in Africa 15 to 34 percent of newborns had contracted it. Ophthalmia neonatorum is caused by infection from a type of gonorrhea in the mother. It can be diagnosed by simple examination under a microscope. However, more than a hundred years age, it was shown that the infection could be prevented by putting silver nitrate drops into the eyes of newborns at birth. The technique is carried out in developed countries but not, so far, in developing countries. But silver nitrate can sometimes cause conjunctivitis, a potentially serious eye infection. Some doctors then, prefer to use tetracycline, an antibiotic that also helps prevent other diseases. A research project at the University of Nairobi, Kenya, funded by Canada's International Development Research Centre (IDRC), aims to evaluate the incidence of this disease. Researchers will compare silver nitrate and tetracycline and look for more efficient therapies.

—(*IDRC Feature*)

The Weakend Sex: A World Health Organization statistical report shows that about half of all women in developing countries—230 out of 464 million—are anaemic. They suffer from a deficiency of one or more essential nutrients, chiefly of iron. Among pregnant women the proportion rises to nearly two-thirds.

—*New Internationalist*
Nov. 83.

Cutting the Waste: The World's food supply could be increased from 10 to 30 per cent without any increase in production, if only the amount of food wasted in processing and storage could be reduced. Estimates of the amount of food lost between harvest and table in some tropical countries, where heat and humidity are combined with lack of proper facilities as major causes of spoilage, run as high as 60 per cent.

EARTHSCAN

(*Contd. fram page 1*)

who could lay their hands on them. Mostly it is the strong who have been able to do so. All this will have to be changed. It is not for competitivé supremacy of the contenders of power that scientists should add strength to their elbow. The scientists must work for the weak dumb as Gandhiji asked the scientists in 1927 at Indian Institute of Science at Bangalore, "I would like you to be men who stand up before the world firm in your convictions. Let your zeal for the dumb millions, be not stiffled in the search for wealth. [illegible]ries that you make have th[illegible]are of the poor as the end in view, all your workshops will be really no better than satan's workshops." Only if the scientists make this resolve, the nations give up the bomb and the people reframe their lives on non violence, the pall offer that hangs on the horizon with its pertrifying influence would be lifted.

Devendra Kumar

(*Contd. from page 3*)

The question is not whether there should be an alcohol fuel industry. Clearly there are many possibilities for converting agricultural wastes and other sources of plant materials into automative fuels that need to be urgently pursued. Over the longer term, a carefully designed alcohol fuel program based on forest products and cellulosic meterials of agricultural origin could become an important source of fuel, one that would not compete with food production. Liquid fuel from plants, whether in the form of alcohol or as direct hydrocarbon extracts, is an energy source that needs to be agressively exploited everywhere. At issue is whether governments can encourage the production of alcohol fuel without inadvertently launching an industry that competes directly with food production.

If the potentially adverse effects of current programs to produce fuel from crops are to be minimzed, several steps must be taken immediately. The governments launching these programs need to warn food-deficit countries of the potential reduction in exportable food surpluses so that they can adjust their agricultural and population policies accordingly. Secondly, the move toward energy crops reinforces the need for an internationally coordinated effort to arrest the excessive erosion of topsoil. Without such an initiative, the widespread planting of energy crops will accelerate the deterioration of the world's cropland base. Where agricultural fuel programs are launched, priority in the use of fuel should be given to tractors and other farm uses over automobiles. And finally, a global food-price monitoring system that would be sensitive to the impact of alcohol fuel programs is needed. Such a system is essential if political leaders are to assess the worldwide impact of national energy crops initiatives on food prices.

Within the food-exporting countries, the short-run attractions of converting exportable food surpluses into alcohol fuel are undeniable. Whether the longer term political effects will be as attractive is less clear. In a world that no longer has any excess food production of capacity, the decision to channel foodstuffs into the production of automotive fuel will inevitabley drive food prices upward. For the world's affluent, such rises in food prices may lead to belt tightening but for the several hundred million who are already spending most of their meager incomes on food, continually rising food prices will further narrow the thin margin of survival.

(*World watch Institute*)

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Published by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Editor : Ravi Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001, Maharashtra, and
Printed at : Swatantra Bharat Press,

MAY 1984

SCIENCE FOR VILLAGES

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uilding a Bridge between the Science Lab and the Village Mudhut

No. 79-80, April-May 1984, Monthly, Annual Subscription : Rs. 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

The Changing Global Perspective

When the British were bringing large tracts of land in various parts of the globe under their flag, all their efforts were guided towards utilizing (exploiting) to their advantage the human mineral, vegetable and animal resources of the alien lands. From this grew the railway systems, the shipping industry, the factories to process and produce goods and the communication and defence mechanisms as could ensure control over these resources. Even in India the various laboratories that were set up and educational and research organisations built, had in their foundation the orientation towards the same goal.

After India became free we multiplied our scientific institutions many times over. Under Prime Minister Nehru's dynamic leadership 'Science and Technology' (S&T) became the main tool in the service of making a New India. The concept of an India with potential of production equal to any of the Western countries obliged us to borrow the models from the various European and American successful patterns. This was natural for a country long exploited and kept backward by outside forces. However the model of the West had concominents which did not fullygree with the situations obtained in this ancient land of farmers and villagers living under great disparities in incomes and with almost half the people not having enough to feed, clothe and house themselves in the most rudimentary fashion even as per their own standards.

Exploitative Systems

This sorry state was brought about by the cumulative effect of explatation of the country by outside forces in which the cities were the conduits hrough which the vast countryside was laid waste. The metropolitan cities being the main stay of exploitation, the smaller the village more vulnerable it was to the market forces. In this chain, the poorer the people the more they suffered. Thus regional imbalances, urban-rural gulfs and disparities abounded, all around. On this set up the Western model fitted ill since the same was born out of a different background viz. :—

Where the accumulated wealth from the colonies was available to sustain a capital intensive production system. The captive suppliers of raw materials and consumers of finished goods in the colonies assured long range profitability through a centralized economy. Newly acquired cheap energy from fossil fuels were considered inexhaustible and monopoly over their availability was assured by the powerful nations. Since the people of less populated, harsh, colder regions of the world being comparatively more aggressive in character overcame densely populated milder natured people ofthe warmer regions of the world, the machines to save labour and give them more exploitative power became natural under the circumstances.

Changing Scene :

All these four factors were absent in the Indian situation and so the Western model was not exactly which was required here. However past is past. Now we have to think of the future. The world situation as a whole has changed. The concepts held sacrosanct long back had to be abandoned. New factors have emerged forcing new concepts to develop. Some of them are:—

(Contd. on page 20...)

from the labs

Lead containing glaze : in making sanitarywares, lead poisoning does not pose a problem. Last year a lead bearing composition was developed which could be fritted at about 850°C, a temperature quite easily attainable in small pottery units in villages. A white glaze maturing at 900°C to 944°C was developed using this frit. During the year a coloured glaze was also developed using the above frit.

Wardha clay : Earlier investigations revealed that clays occurring near Wardha ware suitable for making glazed stone-ware pipes as well as Kitchenwares. Body compositions made from black cotton soil and flyash were studied.

During the year trials were carried out on the body made from black cotton soil and flyash. The biscuited wares were glazed and fired in electric kiln at 1100°C. Further investigations for upscaling are to be done at Wardha.

Manufacture of Sodium Silicate: in our country the annual production of rice husk is nearly 13 million tonnes. After burning and drawing the heat energy from this husk about 2.6 million tonnes of ash can be produced annualy. The ash consists essentially of amorphous silica which is highly reactive. As already reported, a process was successfully developed for the production of sodium silicate solution from rice husk ash. The process was passed on to the CSIR for commercial utilization through NRCE.

Utilization of rice husk ash for heat insulation in furnaces : An incinerator for the production of white, lose bulk density rice husk ash was designed, fabricated and successfully commissioned. Most of the rice husk ash obtained was white and was used in furnace in place of mica insulating bricks.
(*Source* : EGCRI, Calcutta, Annual Report 1980-81).

Solar Energy : A simple and inexpensive solar still has been developed at the Centre for Development of Rural Technology, Ahmedabad. Three litres of distilled water can be prepared in 24 hours by using solar energy from the still. The still costs about Rs. 1,500 and has an anticipated life of 10 years. The distitlled water can be used for making solutions of chemicals for laboratories and solution of acids for batteries.

(Patriot, New Delhi, 11.2.84)

Process for light-weight bricks from clay and coconut pith scaled up: Following the development of the process for making burnt-clay bricks by incorporating a carbonaceous filler material in the clay mix (CN,33 (1983). 68 & 182), Regional Research Laboratory (RRL) Trivandrum, has scaled up the process. The filler material used in the process is coconut pith, an agro-industrial waste material which causes serious disposal problems and pollution. The bricks are lightweight, and consume lesser fuel in production than conventional bricks.

The process consists essentially in mixing tile clay and-suitably graded coconut pith in predetermined proportions. pugging and extrusion in a pug-mill. The bricks are dried to a leather-hard condition and fired in a kiln. The pith burns inside the clay and thus acts as an internal fuel.

In producing light-weight bricks with a typical composition of pith and clay, there has been 10-15% saving in fuel. The bricks possess a cold-crushing strength of 50-55 kg/cm^2, and are about 20% lighter than the conventional burnt-clay bricks. An added advantage is that there is a saving of considerable amount of energy in transportation. Such bricks are ideal for construction in loose soils, where hard foundations are not possible, and also for multistoreyed buildings with structural frameworks.

(Source : *CSIR NEWS* VOL 34 NO. 4 29 FEBRUARY 1984)

Indian Energy Saving Cooking Box : Conservation of every bit of energy has become vital in these days of energy shortage. In this context, a simple and cheap cooking box invented by Dr. S. Natarajan of Perarignar Anna University of Technology, Madras, which saves upto 20% LPG/Kerosene fuel will be of interest.

A wooden box of 46 × 46×40 cm size is filled with paddy haystack leaving central hole of 18 cm diameter to accomodate an average size cooking pot. The haystack is packed tight, with 20cm left unfilled at the top to accomodate a cloth sack (40×35cm) tightly filled with hay.

The pot containing water and cooking materials is covered with a plate and heared as usual on the stove to boiling point and then transferred to the cooking box which is closed after the hay sack is placed in position. The meal is slowly cooked by the thermal energy stored in the boiling water

(Source : *CHANGING VILLAGES* : January-February 1984 Vol. 6 No. 1)

Gandhi and Technology

Some thirty member of the economic conference which was held in Nagpur were present at the opening ceremony of the Magan Museum. The ceremony over, Gandhi led them in conversation saying, "I want you to criticize what you have seen, and tell me the defects you may have discovered. Praise will not help me. I know where I deserve praise. But don't tell me ex cathedra that the whole thing is doomed to failure, as some economists have done before. Such condemnation would not impress me. But if after a close and sympathetic study you discover flaws and point them out to me, I shall feel thankful,"

"Are you against large-scale production ?" they asked. Gandhi replied : I "never said that. This belief is one of the many superstitions about me. Half of my time goes in answering such questions. But from the scientists I expect better knowledge. Your question is based on loose newspaper reports and the like. What I am against is large-scale production of things that the villagers can produce without difficulty."

"What do you think of the Planning Commission ?" was the next question. "I cannot say anything, "replied Gandhi. "It was not discussed in my presence in the Working Committee. Because I still continue to tender advice to the Working Committee whenever my advice is sought, it does not mean that everyhing that emerges from the Working Committee bears my imprimatur or is even discussed with me. I have purposely divested myself of responsibility, so far as the general body of decisions are concerned."

"Do you think that cottage industries and big industries can be harmonized ?" they asked. "Yes," said Gandhi, "If they are planned to help the villages. The key industries, industries which the nation needs, may be centralized. But then I would not choose anything as a key industry that can be taken up by the villages with a little organizing. For instance, I did not know the possbilities of hand-made paper. Now I am so hopeful that I believe that every village can produce its own paper, though not for newspapers, etc. Supposing the state controlled the paper-making and centrlized it would expect it to protect all the paper that villages can make."

"What is meant by protecting the villages?", they asked.

"Protecting them against the inroads of the cities, "Gandhi replied. "In any case, under my scheme, nothing will be allowed to be produced by the cities which can be equally well produced by the villages. The proper function of the cities is to serve as clearing houses for the village products."

"Can we harmonize the cloth-mill activity with the handloom production ?"

"So far as I know, "he said, "my answer is an emphatic 'no'. All the cloth we need can easily be produced in the villages."

"But the number of mills is increasing, "said the economists

"That is a misfortune, "said Gandhi.

"But that is one of the things that the Planning Commission has set itself to do," they said, "It is news to me," he replied. "In that case the Congress will have to scrap its resolution on khadi."

On the same topic, there was a discussion between Gandhi and M. Frydman, a Polish engineer. "The ultimate ideal of having self-sufficient villages is there, "observed the engineer. 'But that can come about where everyone is cultured in the Indian sense of the word. Does not industrialization serve to level the ground ? Is it not sheer waste of energy merely to oppose it? would it not be better to try to change its direction ?

"You are an engineer," said Gandhi. "You will, therefore, appreciate an illustration from mechanics. you know the parallelogram of forces. There the forces do not neutralize each other. Each force acts freely along its own line and we get the resultant which indicates the final direction of motion. It is the same with the problem you have mentioned. As I look at Russia where the apotheosis of industrialization has been reached, the life there does not appeal to me. To use the language of the Bible, 'What shall it avail a man if he gain the whole world and lose his soul?' In modern terms, it is beneath human dignity to lose individuality and become a mere clog in the machine. I want every individual to become a full-blooded, fully developed member of society. The villages must become self-sufficient. And I see no other solution if one has to work in terms of ahimsa. Now I have the conviction. I know there are others who believe in industrialization. I work with all my being for my conviction. The process of adjustment goes on. I don't know what the outcome of it will be. But whatever it is, it will be to the good."

(*Contd. on page20*)

Agriculture and Ecology

Claude Alvares

From a country well-versed in organic methods of farming, we are now turning into a society of uncritical, chemical farmers. Nobody is thinking of soil biology, of methods of farming that are integrated with nature's ways. We are fast forsaking a permanent agriculture. The resources of our soils are being transferred to current account.

Meanwhile, news comes from the U.S. Agriculture Department that about 20,000 of the total 1.7 million American farmers are now practising organic farming, particularly in the Corn Belt. Twenty years from now we can expect to catch up on the lag and be organic farmers once again. Today our scientists dismiss organic manures or non-toxic pesticides like neem extract as "eighteenth century science." For the present we are busy mortgaging our entire agriculture to oil-based fertilizers, for which we require crippling amounts of foreign exchange.

Soil analyses are carried out merely to guage NPK deficiency, the sale of which benefits MNCs, and not to measure lack of biological friends like bacteria, or humus. More and more farmers are getting used to buying fertilizers, when they made their own before. The deadly long term impact of chemical fertilisers has been documented elsewhere and is well known, but our farmers are not taught about it. They only experience the phenomenon of depleting, compacted soils after many years of chemical fertilisers and then there is no one to blame.

How absolutely lacking in foresight we can be readily understood were we to discuss our policy regarding mechanization. According to C.V. Sheshadri of the MCRC, modern farmers are taking to no-till farming and predictions are that by 2000 A.D. 45% of total US cropland will be under no-tillage cultivation. "This will just when we will be mass producing tractors and farm implements and catching up with the present phase of western agriculture. At that time if asked to go back to no-till which is part of our ancient ethes (e.g. Jhumming farming) there is bound to be considerable trauma among the tractor manufactures. Doubtless the moneyed interests will win."

No doubt, some forms of modern no-till involve the use of weedicides and this will benefit the chemical giants. But in India, besides Jhumming, we have other farms of settled no-till farming, which we are forsaking. And a very clever Japanese farmer has recently introduced his own version of no-tillage agriculture that uses no chemicals at all : Masanobu Fukuoka recently introduced his ideas in a book called, *The One Straw Revolution.*

Other development are also working against a sound environmentally oriented agriculture. The introduction of pumpsets has reduced the cattle population. So has the so-called white revolution : cross bred bulls bred from exotic imported breeds are useless for draught, and invariably end up with the butcher. Thus the number of draught animals is decreasing a an alarming rate, and this is responsible for soils not getting their due of dung and composts.

Chemical fertilisers are not friendly to the earthworm : India's earthworm population will soon be non-existent, except during the monsoons. In the U.S. earth-worm farmers not merely market earthworms for a variety of agricultural work jobs like soil aeration, but for making large quantities of rich, nutrient castings which applied to the soil, improve its structure and help produce healthier crops.

Becuase of such tendencies, we have reached a stage where we need to use large quantities of fungicides, weedicides and pesticides. Albert Howard's cardinal tenet that a healthy plant did not need pesticides and fungicides, and that health of this sort came only through rich organic humus at the base of the plant, is still true. Excessive dumping of nitrogenous fertilisers also play their part in plant maldevelopment and weakness, thus laying it open to attack. In the meanwhile, the waters we drink are getting polluted : Punjab is a fine example, where a large number of drinking water wells already have above the threshold quantities of dissolved chemicals.

Plenty of work abroad has been done on biological methods of pest control, but since all agricultural research institutes, particularly the international ones like the IRRI, cannot yet or will not yet dispense with chemicals, one in this country is putting much heart into the softer strategy. The ICAR has a project on biological methods, and there is also the India Station of the Commonwealth Biological Research Institute at Bangalore, but we have not reached the stage where we can mail insects to farmers *en masse* or produce them in goegraphically distinct zones.

The role of forests in agriculture is declining in influence. Traditional varieties of trees that provided mulch for fields are fast being de-forested. Intensive agriculture and forest development schemes like sericulture and eucalyptus plantations do not add any mulch or humus to the soil. In sericulture, every leaf is plucked from the tree and nothing is returned to the soil. De-forestation is also having its impact on a less noticeable but significant agricultural aid : the bees. Bees aid nature in cross-pollination, but as they get less and less, productivity is bound to fall particularly in fruit and plantation areas.

The use of large-scale dams and their deleterious effects on soil salinity and water-logging is now well known. According to V.A. Kevda, one-time president of the International Society of Soil Science, "in our time the majority of both ancient and newly-constructed irrigation systems lack any means of deep horizontal or vertical drainage and also lining of the irrigation canals for the prevention of salinity and waterlogging, respectively. Because of these technical mistakes, only 20-40 per cent of irrigated lands are producing good harvests : the remaining 60-80 per cent are getting gradually more and more saline and infertile."

Is there any good news on the ecology front in agriculture? Yes, even if it's little. First and foremost, chemical fertilisers prices are going up,they can only go up, and they will keep going up, since they are pegged to the price of oil. This will and is already reducing chemical fertilisers use in the country as a whole.

In the dairy business, there is new growing disenchantment with the performance of exotic breeds, and a revival of interest in Indian local breeds (Ongole, Sahiwal, Gir) this is bound to increase the draught animal population once again.

The ICAR is now making efforts at popularizing bio-fertilisers like blue green algne. The technology is simple, cheap, decentralized and effective. Poor farmers can use algae as fertiler with no chemical inputs whatsoever and yet increase yields. dramatically.

There is also some propagation of rhozobia cultures in association with leguminous crops. Legumes do not tolerate chemical fertilisers. The rhozobia aid the plant nodules to fix nitrogen directly from the air more efficiently and in larger quantities.

Interest in organic farming is very slowly growing, and the first organic farmers' convention will take place mid-March this year. The MCRC recently produced an excellent monograph on biodynamic farming. Auroville residents have been consistently organic in their methods. The Rustic experimental farm in Goa is in the process of being converted ito an organic farming institute. Mr. Sailendra Nath Ghose is directing a national level project on environmentally oriented development, based on a model of ecolocigally friendly technologies in farming. ●

THE EARTHWORM

The earthworm is nature's marvellous effluent control machine as it eats practically almost any matter except rubber, plastic, glass and metal. According to a Taiwanese university report, 20 million worms could handle 80 metric tons of pulp sludge daily or about five grams of sludge per worm per day.

And whatever the worm eats get transformed into organic fertilizer. The worm's excretions are rich in nitrates, phosphates, and potash in other words a rich source of organic fertilizer.

There are several thousand known species of earthworm in the world but only seven of them are of interest to commercial earthworm growers.

The one grown in the Philippines is the Pheretima Asiatica which orginally came from China. Experiments with a local species are carried out at the Central Luzon State University.

A mature earthworm is about 12 to 15 centimetres long. No one knows how long they live, although some have been estimated to live 15 years. Breeding them is not difficult, according to a manual put out by Earth Marketing, because of the worm's ability to double their population in a month while eating nothing but waste.

A mature worm lays an egg capsule once every seven to ten days. Within three weeks, two to 200 young worms come out of the capsule and start reproducing by the time they are three months old. A breeder starting with a stock of 1000 worms in December will have 833,000 worms one year later. The Technology for earthworm breeding has been standardised in the Philippines and a breeder investing $1000 is assured a profit of $ 600 or more a year. The company supplies the 'breeder stock' and the grower sells the harvested worms back to the company for export or domestic processing and consumption.

A would-be grower gets his stock of one kilogram of breeder worms in a suitcase-size wooden box complete with 'beddings'. The worms can remain in the boxes for up to three months without getting over-crowded; then they are shifted to a worm house.

The worm house should protect the worms from heat and rain and must have freely circulating air. It is usually located in a garage or basement, although outdoor sheltering under tree shade is also common.

Mang Genio, a Philippine driver, made enough net profit in one year to be able to resign his job and devote himself fulltime to worms. Promoters are convinced that vermiculture is the answer to the economic needs of 13 million low income Filipinos.

(UNESCO FEATURES)

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in English, French and Spanish
by the Food and Agriculture
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Home-Made Weaning Foods

xample of a Multi-mix

This is prepared separately from the family meals. The weight of the raw ingredients and the volumes of the cooked ingredients are given. The total energy value and the approximate volume of the cooked meal is shown here and in each of the following recipes 1—36. There is a space for filling in the weights of the raw ingredients in terms of the volume of a local measuring utensil.

Example of a Family Cooking Pot

The second example shows a family pot recipe from which cooked food would be taken in suitable proportions for the young child.

The proportions by weight of raw ingredients are shown for interest with the suggested cooked amounts to make the child's multi-mix meal. These cooked amounts must be converted into local household measures.

Multi-mix

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
40	Rice	100	½ teaspooful
10	Legume (mung bean, without skin)	30	1 local spoonful
5	Ghee/butter	5	1 teaspoonful

1. Mix rice and legumes ; wash once or twice to clean.
2. Add water and cook gently in a covered pan until rice is soft and water absorbed.
3. Add butter/ghee.

Energy 220 kcal Approx cooked volume 150 ml.
(India/Pakistan)

RECIPES USING

Wheat

1. *Multi-mix*

		Local measure
Wheat flour	25 g	
Lean meat/chicken/fish (cooked)	10 g	
Ghee/oil	5 g	

1. Make a chapatti with some water and the flour.
2. Mince or cut finelv the cooked meat/chicken or fish and mix with the oil.
3. Use the mixture to eat with the chapatti.

Energy 150 kcal Approx. volume 100 ml
(India/Pakistan)

2. *Multi-mix*

		Local measure
Wheat flour	40 g	
Lentils	20 g	
Sesame seeds (no skins)	5 g	

1. Mix the flour, ground lentils, and sesame seeds.
2. Add water, and cook gently into a gruel.

Energy 240 kcal Approx volume 150—200 ml
(Egypt)

3. *Multi-mix*

		Local measure
Tarhana (wheat and yoghurt)	50 g	
Oil	5 g	

1. Mix one cup water and tarhana, bring to boil, stirring well.
2. Cook gently, until the mixture thickens.
3. Mix in the oil.

Energy 240 kcal Volume 150—200 ml
Turkey)

To the basic mix could be added :

	Lentil—cooked till soft	1 heaped tablespoon
(*OR*	Yoghurt	2 tablespoons
OR	Cottage cheese	1 tablespoon
OR	Cooked minced meat	1 teaspoon

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4. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
25	Wheat flour	1 small chapatti	
20	Mung beans	60	
40	Spinach leaves	15	
25	Carrots	10	
5	Ghee	5	
50	Banana	15	
50	Milk, buffalo	50	

1. Make flour into one small chapatti.
2. Cook clean, wash beans in a little water till soft, with spices.
3. Add washed, chopped spinach leaves and continue cooking until soft.
4. Add oil and mix well. Serve with chapatti.
5. Give banana to eat and milk to drink.

Energy 330 kcal Approx. volume 200 ml
(India)

Rice

5. *Multi-mix*

		Local measure
Rice	40 g	
Mung dhal (split beans)	10 g	
Ghee or butter	5 g	

1. Mix cleaned rice and split beans.
2. Add water and cook gently until rice is soft and water s absorbed.
3. Add ghee and mix well.

Energy 220 kcals Approx. volume 150 ml
(India/Pakistan)

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6. *Multi-mix*

		Local measure
Rice	40 g	
Kidney beans	30 g	
Lard	10 g	
Soft cheese	10 g	

1. Add water to the clean, washed beans ; bring to the boil.
2. Cook gently, till nearly all the water has been absorbed.
3. Beat the beans until smooth.
4. Add lard and slowly cook beans in a frying pan till firm paste.
5. Serve with the cheese and the rice, washed and cooked in the usual way.

Energy 340 kcal Approx. volume 200 ml
(Guatemala)

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7. *Multi-mix*

		Local measure
Rice	70 g	
Fish, fresh	30 g	
Onion	20 g	
Oil	5 g	
Fish sauce	4 g	
Ginger juice	5 g	

1. Boil rice till it becomes a porridge or gruel.
2. Chop fish and onion into small pieces.
3. Add fish and onion to rice gruel and continue cooking till soft.
4. Stir in the oil.
5. Add fish sauce and ginger juice to taste.

Energy 350 kcal Approx. volume 200—250 ml
(Burma)

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8. *Multi-mix*

		Local measure
Rice	60 g	
Minced lean meat or fish	25 g	
Peanut oil	5 g	

1. Cook rice till soft and creamy.
2. Add the minced meat or fish and cook until soft
3. Add the oil and mix well.

Energy 300 kcal Approx. volume 200 ml
(Hong Kong)

9. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
60	Boiled rice	160	1 small cup
20	Tinned fish (mackerel)	120	2 tablespoons
40	Pumpkin, cooked		2 tablespoons
25	Cocount cream		2 tablespoons

Add the mashed tinned fish, pumpkin, and coconut cream to the hot boiled rice.

Energy 360 kcal Approx. volume 250 ml

(Papua New Guinea)

10. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
50	Rice, boiled	190	
15	Cowpeas, boiled		
10	Salt fish	25	
5	Lard		
5	Onion		
20	Sweet potato	20	
	Lime/lemon juice	100	
5	Sugar		
	Water		

1. Cook cowpeas in boiling, salted water.
2. When almost soft, add rice and cook till soft.
3. Boil fish, pound it and fry in fat till crisp.
4. Add onions to fish with water to make gravy.
5. Boil sweet potato, cut in small pieces.
6. Serve rice, peas/fish mixture, and sweet potato.
7. Make a drink of lime juice, sugar, and water.

Energy 330 kcal Approx. volume 200–250 ml (meal)
100 ml (drink)

(Barbados)

11. *Family cooking pot*

	Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
	60	Rice, boiled	160	
	20	Egg, custard	40	
	10	Spinach	20	
	5	Sesame seeds		
	2	Sesame seeds		
(a pinch)	3	Sugar		
to taste		Garlic		
to taste		Soy sauce		

1. Wash rice and cook till soft.

2. Wash spinach, remove stalks and roots. Cook leaves for about one minute in a small amount of boiling water,

3. Chop cooked leaves, add oil, sesame seeds, sugar, and garlic and soy sauce to taste.

4. Serve with rice.

5. Make egg custard : beat egg and equal quantity of water. Add seasonings (sesame seed, noucham, green onion, etc.) Steam until set and serve.

—If available, a little minced meat, soybean curd, and chopped onion can be used.

Energy 320 kcals Approx. volume 250 ml

(Korea)

12. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
60	Rice, boiled	160	
20	Fish, fresh	15	
	—fried	51	
5	Fat, for frying		
40	Dark green leaves (cajan/ bayan)	20	
	Sambal—optional (to taste)		
50	Banana, ripe	small	

1. Cook rice in water.
2. Fry fish for side-dish I.
3. Steam spinach or cook in boiling water for 1—2 min for side-dish II.
4. Serve banana, after the meal.

Energy 290 kcal Approx. volume 250 ml

(Indonesia)

13. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
40	Parboiled rice, cooked	100	
15	Chick pea flour	60	
30	Dark green leaves		
5	Oil		
100	Milk, buffalo	100	
40—50	Banana, ripe	small piece	

1. Wash rice and cook in twice its volume of water, till all water is absorbed.
2. Prepare a vegetable sauce, using pea flour, green leaves, oil, and any flavourings to serve with the rice.
3. Serve milk as a drink, with the banana.

Energy 360 kcal Approx. volume 200 ml (meal)
100 ml (drink)

(India)

Millet/sorghum

Note : if malted flour is used instead of unmalted flour, less water is required to make a gruel of the same consistency. Such a gruel would have a higher energy density

14. *Multi-mix*

		Local measure
Sorghum flour	50 g	
Field pea flour	10 g	
Fenugreek (soaked overnight)	5 g	
Oil	5 g	
Sugar	5 g	

1. Mix sorghum, pea flour, and fenugreek with water.
2. Bring to boil, stirring well.
3. Add oil and sugar.
4. Cook gently for 15 minutes. Add a little salt to taste.

Energy 259 kcal Approx. volume 150—200 ml

(Ethiopia)

15. *Multimix*

		Local measure
Sorghum meal	40 g	
Bean flour	20 g	
Red palm oil	5 g	
Onion, to taste	5 g	

1. Mix the bean flour to a smooth paste with a little wate.
2. Add some more water, bring to the boil, and cook gently with the chopped onion.
3. When nearly cooked, add the sorghum flour and stir well.
4. Cook a further 15—20 minutes.
5. Add the oil.

Energy 270 kcal Approx. volume 200—250 ml

(Nigeria)

16. *Multi-mix*

		Local measure
Sorghum flour	50 g	
Sugar	5 g	
Milk, evaporated	5 g	

1. Mix flour smoothly with a little water.

1, Add more water and bring to the boil.

3. Cook gently, to make a smooth gruel.
4. Add evaporated milk and sugar.

Energy 205 kcal Approx. volume 150 ml

(Nigeria)

17. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
25	Sorghum flour (Jowar)	50	½ roti
20	Parboiled rice	50	
10	Chick pea flour	100	
20	Dark green leaves		
5	Oil		
100	Milk, buffalo	100	

1. Use sorghum flour to make a roti (bread).
2. Wash rice and cook in water till all has been absorbed.
3. Make a vegetable sauce with chick pea flour, green leaves, and flavourings. Serve with the rice.
4. Serve milk as a drink with the roti,

Energy 355 kcal Approx. volume 150 ml (meal)
100 ml (drink)

(India)

Maize (corn)

18. *Multi-mix*

		Local measure
Maize flour	50 g	
Cowpeas	30 g	
Groundnuts	15 g	

1. Mix maize to a smooth thin paste with water.
2. Bring to boil, stirring well, and cook gently until paste is smooth and light.
4. Grind the toasted groundnuts, without skins, to a paste and add to the cooked cowpeas.
5. Serve this soft mixture with the cooked maize paste.

If available, some egg could be beaten into the hot mixture.

Energy 290 kcal Approx. volume 250—300 ml

(Tanzania/Malawi)

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19. *Multi-mix*

		Local measure
Maize meal	40 g	
Red palm oil	5 g	
Sugar	5 g	
Milk, evaporated	10 g	

1. Add a little water to the maize meal to make a smooth paste.
2. Add some more water, bring to the boil stirring well, and cook gently for about 15 minutes until the gruel is a semi-solid consistency.
3. Add the milk, oil and sugar.

Dried skimmed milk could replace the evaporated milk; Check the label for vitamins A and D if red palm oil is not used.

Energy 225 kcal Approx volume 250 ml

(Nigeria)

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20. *Multi-mix*

		Local measure
Maize flour	40 g	
Sugar	10 g	
Groundnuts	25 g	
Milk	100 g	

1. Mix maize meal with the water to make a thin paste:
2. Bring to the boil and cook gently until it is smooth and it thickens.
3. Remove the skins from the groundnuts after toasting and grind them to a smooth paste.
4. Add to the maize mixture and cook for a few minutes.
5. Remove from the fire, and add the sugar and milk.

Energy 395 kcal Approx volume 250-300 ml

(Tanzania/Malawi)

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21. *Multi-mix*

		Local measure
Corn dough (masa)	60 g	
Fat for frying		
Avocado pear	25 g	
Onion	5 g	
Dry white cheese	10 g	
Lemon, salt, and marjoram for flavouring.		

1. Shape the corn dough into very thin tortillas and fry.
2. Mash the avocodo pear, add finely chopped onion, lomon, and other flavourings.
3. Spread the avocado mixture on the fried tortilla.
4. Add the powdered white cheese over the top.

Energy 215 kcal Approx volume 150 ml

(Guatemala)

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22. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
50	Maize meal (for koko)	200	
25	Cowpeas	70-80	
2-3	Smoked fish (dried)		
10	Onion		
10	Tomato		
5	Red palm oil		
	Leaves for moulds		

1. Remove skins from soaked beans and grind to a smooth paste.
2. Grind the onion and tomato and add to the bean paste with the oil, pounded fish, and a little salt.
3. Add enough boiling water to soften the paste.
4. Wrap paste into moulds in the leaves.

5. Steam for at least one hour.

6. Serve the hot cooked paste with the koko-a thick maize porridge.

Energy 320 kcal Approx. volume 250-300 ml

(Ghana)

Tef flour

23. *Multi-mix*

		Local measure
Tef	40 g	1 sini
Chickpea flour	20 g	1 small sini
Dark green leaves (kale)	30 g	about 5 leaves
Oil	5 g	1 teaspoon
Sugar	5 g	1 teaspoon

1. Make bread (injera) from the tef (or use 1/2 tef bread).

2. Mix pea flour with water and oil and boil gently for about 10 minutes.

3. Add the finely chopped kale, and boil another 10 minutes.

4. Add the sugar and a little salt.

5. Serve the vegetable stew with the injera.

Energy 290 kcal Approx. volume 200-250 ml

(Ethiopia)

Potato

24. *Multi-mix*

		Local measure
Potato, peeled	150 g	2 potatoes
Dark green leaves (kale)	40 g	about 5 leaves
Chickpea flour	20 g	1 small sini
Oil	5 g	1 teaspoon

1. Mix the chickpea flour with water, add the oil, and boil gently together.

2. Chop the potato into pieces.

3. Chop the kale coarsely, put on top of the potatoes, and boil till the potatoes are soft.

4. Mash the potatoes and kale and add to the chickpea mixture.

5. Add a little more water if necessary, season with salt, and simmer until the mixture is smooth and soft.

Energy 250 kcal Approx. volume 200-250 ml

(Ethiopia)

Sweet potato

25. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
150	Sweet potatoes, peeled	220	1 small
20	Coconut milk		2 tablespoons
20	Groundnuts/peanuts		10 peanuts
15	Dark green leaves		
10	Tomato		1 slice
5	Spring onion		1 small
100	Pineapple		1/4 small

1. Cut the peeled sweet potato in small pieces.
2. Wash and chop onion, tomato, and dark green leaves.
3. Place a leaf inside a 1/2 cononut shell.
4. Put the potato and the vegetables inside the shell with the groundnuts.
5. Squeeze coconut milk over the vegetables.
6. Cover with a leaf. Put other half of shell on top and tie tightly into place.
7. Boil in a pan of water for nearly one hour.
8. Open shell and give a mashed portion to the child.
9. Serve the pineapple after the meal.

Energy 345 kcal Approx. volume 200-250 ml

(Papua New Guinea)

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26. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
100	Sweet potato, peeled	100	
15	Fresh fish	70	
40	Dark green leaves		
25	Coconut, shredded		
60	Banana, ripe		

1. Prepare coconut milk.

2. Cut the sweet potato into pieces and put in pot with half the coconut milk, a small amount of water, and a little salt. Cook gently for about 20 minutes.

3. Wash the leaves, cut in pieces and put in pot with the rest of coconut milk, a little water, salt, and any onion to flavour. Cook gently for about 20 minutes.

4. Wash fish, remove any visible bones, put on top of vegetables and continue cooking for another 10 minutes.

5. Serve with the potato which can be mashed with any remaining cooking liquid.

6. Serve banana after the meal.

Energy 310 kcal   Approx. volume 150-200 ml

(Tonga)

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27. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
150	Sweet potato	150	
5	Lean beef	100	
5	Melon seeds (egusi)		
40	Spinach		
10	Tomato		
10	Onion		
10	Red palm oil		
10	Dried smoked fish		

1. Wash beef, add a little water and salt, and cook gently.

2. Grind the melon seeds (egusi) and wash and chop the spinach.

3. Heat palm oil. Add sliced onion and tomato and the drained cooked beef.

4. Fry for a few minutes.

5. Add the meat stock and the egusi.

6. Simmer for about 10 minutes. Add the chopped DGLV.

7. Cut the cleaned, smoked fish into pieces and add to the stew.

8. Serve the stew with cooked and pounded sweet potatoes.

Energy 340 kcal   Approx. volume 250 ml

(Ghana)

Yam

28. *Multi-mix*

		Local measure
Yam, peeled	150 g	
Powdered fish	10 g	
Red Palm oil	10 g	

1. Cut yam into small pieces, put in a pot and just cover with water.

2. Bring to the boil and add powdered fish.

3. Cook gently until yam is soft.

4. Mash yam till smooth and beat in the oil.

Energy 260 kcal   Approx volume 150-200 ml

(Ghana)

---

29. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
100	Yam, peeled	100	
5	Crayfish powder	100	
20	Tomatoes		
20	Onion		
10	Red palm oil		
40	Spinach		
60	Banana, ripe		

1. Slice the yam, add just enough water to cover, and boil gently until soft.

2. Chop the onion and tomatoes.

3. Cook gently as a stew, with the crayfish powder and the oil.

4. Chop the spinach leaves and add to the vegetable stew and continue cooking.

5. Pound the cooked yam until smooth and serve with the stew.

6. After the meal give the banana.

Energy 310 kcal   Approx. volume 200 ml

(West Africa)

Taro/cocoyam

30. *Multi-mix*

		Local measure
Cocoyam, peeled	100 g	
Lean meat/chicken	15 g	
Red palm oil	10 g	

1. Cut the peeled and washed cocoyam in a pot and cover with water.

2. Add the chopped meat or chicken.

3. Bring to the boil and cook gently till meat is tender.

4. Mash till smooth and beat in the oil.

Energy 215 kcal   Approx. volume 100-150 ml

(West Africa)

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31. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
175	Taro, peeled	200	1 small
30	Avocado pear		1/8
10	Beans, soy or other local bean	50	2 eating spoons
20	Coconut milk		2 tablespoons
10	Pumpkin tops		1 leaf and top

1. Pour boiling water over the beans and leave them to soak overnight.

2. Next day, pour off water, and remove skins from the beans.

3. Boil the beans in the coconut milk.

4. Cut the taro into small pieces and boil until soft.

5. Wash and chop pumpkin tops and add to the beans.

6. Remove skin and stone from avocado.

7. Mash the cooked taro and avocado until smooth.

8. Serve with the bean stew.

Energy 305 kcal Approx. volume 250 ml

(Papua New Guinea)

Banana/plantain

32. *Multi-mix*

		Local measure
Banana, ripe	120 g	
Groundnuts, roasted	30 g	
Dried skimmed milk	10 g	

1. Pound the groundnuts and a little water to make a paste.

2. Beat the milk powder with a little water till smooth and add to the groundnut paste.

3. Peel the banana, put in a pot and just cover with water Cook gently until done.

4. Drain off the water and mash the banana.

5. Combine banana and groundnut paste mixture.

Energy 345 kcal Approx. volume 150 ml.

(Uganda)

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33. *Multi-mix*

		Local measure
Plantain	100 g	¼–½ plantain
Fish, fresh	25 g	1 tablespoon without bones
Oil	10 g	½ tablespoon

1. Cut plantain into small pieces.

2. Wrap in a banana leaf with the fish and a little water. Tie leaf carefully.

3. Steam for 2–2½ hours.

4. Open the leaf. Mash cooked plantain and fish with oil until smooth.

Energy 235 kcal Approx. volume 150 ml

(East Africa)

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34. *Multi-mix*

		Local measure
Plantain	50 g	
Kidney	5 g	
Oil	10 g	
Sugar	10 g	

1. Cook the plantain until soft and mash.

2. Boil the skinned beans till soft, and mash them adding a few breadcrumbs to improve the texture.

3. Add some of the sugar to the mashed beans.

4. Fry the mashed beans in the oil.

5. Wrap a portion of the mashed plantain, around the fried beans.

6. Fry in oil and sprinkle on the rest of the sugar and a little cinnamon.

Energy 210 kcal Approx. volume 100 ml

(Guatemala)

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35. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
100	Plantain	90-100	
30	Bambara groundnuts	60-70	
5	Dried shrimps	25-30	
10	Onion		
10	Tomato		
	Peppers to taste		
5	Red palm oil		

1. Soak beans overnight.

2. Next day boil beans in fresh water until soft (2–2½ hours).

3. Fry peppers, tomato and onion in oil with the dried shrimps.

4. Roast the plantain till soft.

5. Serve the mashed beans and plantain with the vegetables.

Energy 300 kcal Approx. volume 200 ml

(West Africa)

Cassava

36. *Family cooking pot*

Equivalent raw weight (g)		Approx. cooked volume (ml)	Local measure
60	Cassava, flour	150	
36	Meat, lean	100	
	Wild mango kernels		
10	Tomatoes		
10	Onion		
2–5	Dried crayfish		
5	Red palm oil		
1–2	Fermented locust bean and peppers to taste		

1. Cut meat into small pieces, add water and boil gently until nearly soft.

2. Pound the mango kernels to a smooth paste and add to the ground tomato, onion, red pepper, and locust beans.

3. Add to the meat, with the oil and crayfish.

4. Add a little more water and continue cooking for about half an hour.

5. Make a porridge with the cassava flour.

6. Serve with meat and fish stew.

Energy 340 kcal Approx. volume 250 ml

(Nigeria)

(Source : Manual on Feeding Infants and Young Children)

Computer And The Third World

Robert Charbonneau

SENEGAL, IDRC—In the West, the idea is simply to get as many people as possible to learn how to use computers. In the developing countries, however, more basic questions are being asked. How, precisely, is the computer challenge to be met? How is the computer to be used, and in what context ? Is the technology to be adapted to the users, or must one simply take it for granted that the computer brings with it a dose of cultural colonialism ?

There are those who believe that the Third World can bypass industrialization and leap ahead of the West by committing itself wholly to the world of high-tech information. Others, however, point out that computerization in the countries of the Third World has no other goal than to enlarge the market for the multinationals that control data systems.

In Senegal, in West Africa, the ministries of Scientific and Technical Research and of National Education have paid particular attention to the work of professor Seymor papert at the Massachusetts Institute of Technology, in Boston. Up until the end of 1982, Papert was director of the World Centre for Information Systems and Human Resources in Paris, an organization supported by the French government.

Professor Papert is known for having developed a computer language that is grounded in one of the principles of the great Swiss psychologist, Piaget. This principle is simply that children are responsible for their own learning.

The language, called Logo, tries to develop the child's capacity for self-learning.

Papert is convinced that any young child can learn a language more rapidly and more spontaneously than any other subject thereafter. "Learning without instruction is possible,' he asserts.

In March 1982, a group of trainees made up of a computer expert, a professor of mathematics, an educational psychologist, a sociologist and two teachers at Dkaar's Normal School, decided to experiment with different ways of teaching data processing to children between 7 and 11, from different social classes.

The Logo language allows the child to call up on the screen an abstract form of a turtle and to control it at will depending on the instructions given him. Then, as he learns more, he fills the turtle's environment with geometric forms representing a square, a sun and other elements made up from simple forms. The child's learning becomes dynamic. It is not the computer that is programmed for the child, rather it is the child who discovers the machine's language and program.

The first results indicate that children from a more priviledged background learn more quickly at first. But children from under-priviledged backgrounds, and even very poor backgrounds, eventually close the gap.

At the Ministry of Scientific and Technical Research, the working group has set out to compile all the children's accomplishments and the necessary knowledge involved. A second study is analysing how learning takes place and is utilized by children in the same age group, and in different age groups. In the end, it will mean proposing different learning methods to the legislators.

French thinker Jean-Jacques Servan-Schreiber, in "Le defi-mondial" (The World Challenge) published in 1981, argues that the computer will revolutionalize communications in the countries of the Third World. The computer, because of its flexibility, its immediate recall and its simplicity is believed capable of profoundly modifying ways of thinking.

"Those who will have learned the thought structure of Logo will be able to meet and find solutions to the problems they have in common," says Schreiber. Farmers in the Third World, for instance, could keep data on their food stocks and thus better manage their resources.

Schreiber goes further. He asserts that the very fact of experimenting with a computer means a more flexible attitude that could result in Third World farmers bridging the gap between modern agricultural knowledge and their traditions.

The next step would be natural for Schreiber. Communities could be linked by satellites and share their knowledge over great distance. There is already research underway to develop campact and reliable micro-computers for use in the remotest corners of the world.

Not everyone agrees with Schreiber.

Some see his computer advocacy as naive and riddled with underlying economic interests which barely disguise a desire to perpetuate colonial relations.

For the moment, computer technology is not yet accessible. Illiteracy remains a serious obstacle when the keyboard controls the computer. Research now underway in schools indicates that the computer, just as speech and writing, have strong cultural connotations. And the translation of software packages is only a partial solution to the problem of computer use in developing countries.

Whatever the outcome, Third World governments, such as Senegal's are resolutely involved in current research. It remains to be seen if the use made of this advanced technology will really help the development of the people of the Third World. Papert himself admits that computer technology is not the solution to all ills.

"This technology can create small enclaves where development will be so rapid that it will necessary take place at the expense of evrything else around," says Papert, "The result in these countries could be an even greater disparity among social classes.

As anything new, the Logo Language has met with and continues to meet doubt. On the one hand, its implementation profoundly modifies the role of the teacher. On the other, there is concern that the child is not sufficiently taken into consideration in these experiments. The teachers believe that it would be preferable to set precise goals for the project, to involve different government ministries if necessary and to set up a module to provide guidance. And then, such experiments should not impose a financial burden on an already costly educational system. This could be the determining factor in the end even if the price of computers continues to fall.

The Government of Senegal is convinced that the computer will become an integral part of the school system, "whether one likes it or not, now or later." And so there is a commitment not to miss out on the computer revolution. And as an added means of ensuring this, the government has just had Wolof, one of the six national languages, translated for the computer.

Many observers postulate that that computer will mean closer links among the different cultural groups in the world. But not Papert. He is convinced that alternative cultures will result from the use of the computer. Minority groups, women poets, and so on, will claim the micro-computer for the defence of their own interests and cultures. Only the future will tell what impact the computer age will really have on the development of the Third World. But, whatever it is, it will be profound.

(IDRC Feature)

BOOK WATCHING

Literature on Solar Energy

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WINDOW TO THE WORLD

Building Panels From Rags : A European firm has developed a low-cost technology for the manufacture of strong self-supporting building panels with good insulation features. It is a simple technology, similar to that used in the manufacture of paper.

The product produced with this technology is new, with no exact equivalent on the market. However, prices in Europe compare extremely well to those of products with similar qualities.

The raw materials needed are : wastepaper (old nespapers for instance), waste textiles (woolcombing waste), cardboard of standard quality and various chemical products. Other sources of cellulose, can also be used if they receive appropriate chemical treatment. For instance coffee husks and papyrus have given good results.

The panels are thermally and acoustically insulated. They are light (d = 320 kg/m^2). They are also rotprof and fireproof. Moreover, the production process provides protection agaisnt the onslaughts of rodents and humidity. (These qualities have been confirmed by tests carried out in laboratories specialized in construction materials).

The panels can be used for wall cladding and ceilings, or as dividing walls. They are easy to put up and can be painted, covered, plastered and stored.

The experience gained from an operating factory, shows that a plant based on this technology can produce 750 m^2 of panels per day in one shift, or 1,500 m^2 per day in two shifts.

The plant provides employment for 14 people and the total investment required is estimated to be US $ 1 million. The basic equipment covers the preparation of waste and pulp, heat sealing, cutting milling and handling.

(Source : *THE COURIER*)

New Peanut Sheller: The University of the Philippines, Los Banos, has developed a peanut sheller that eases the tedious post-harvest task of peanut shelling. A convertible, power-driven or manually operated machine, the sheller consists of framework drive shafts and pulleys, and a shelling unit. It can shell different sizes of the two-bean-per-pod variety of peanuts, and up to 80 kilograms per hour with only 5 percent breakage. The best results are obtained when the sheller is operated by two people—one for loading and the other for collecting the shelled peanuts.

For more information, write : Philippine Agricultural Mechanization, Information and Documentation Section, College of Engineering and Agro-Industrial Technology, University of the Philippines, Los Banos College, Laguna, Philippines 3720.

(*Source*: LIFE, February-March, 1984)

New Oral Rehydration Solution

The International Centre for Diarrhoeal Disease Research, Bangladesh, reports that it has developed an improved oral rehydration solution using rice powder instead of the standard sugar or glucose. The substitution of rice provides more calories, reduces stool output during cholera, reduces fluid loss, and is considered more culturally acceptable because rice is thought of as having a cooling effect on the "hot" diarrheal stomach. The use of other traditional foods in oral rehydration therapy is now being investigated. For more information, write : the International Centre for Diarrhoeal Disease Research, Bangladesh, G P O, Box 128. Dhaka 2, Bangladesh.

(*Source* : LIFE February-March, 1984).

Using Surplus Crops as Animal Feed : In an effort to find less expensive food for cattle, and to utilize surplus bananas, the Banana Producers Association of Uraba in North Colombia has studied the possibility of using bananas as cattle feed. Food and Agriculture Organization found that bananas can be fed to cattle in both fresh and dried forms, are easily digested by the animals, and provide important supplies of potassium and Vitamin A. Best results were obtained when the feed consisted of a 4 : 1 ratio of bananas to cereal meal. Using this mixture, the cattle showed weight gains and increased milk production, although there was a drop in the fat content of their milk.

(*Source*: LIFE February/March, 1984)

points to ponder

Calcutta garbage provides fuel: About one Third of India's energy demands can be met by bio-mass using biotechnologies already available. Calcutta garbage can be turned into cooking gas for 20,000 city houses, according to Dr. Sambhunath Ghosh of the Institute of Gastechnology in Chicago and a U.S.-based adviser to the Indian biotechnology board.

(Times of India, 5-3-84)

Importance of organic manure : In India, there are 240 million animals. They can easily give 780m. tons of cowdung every year at the rate of 10 kg. Per animal on an average. "Not knowing the importance of cowdung, people in villages burn 33% of dung as cowdung cakes. The remaining 66% is left in open and consequently there is loss of Nitrogen. To enhance the value of organic manure, dung and urine should be mixed. If the dung is put in bio-gas plants, we can get 15m. tons of organic manure, which is sufficient for the sprinkled on slopes of hills where grass is grown, the yield will increase and milch animals will yield more milk. Valuable partures also can created provided grassy land is given doses of manure and water.

(*Source* : Krishi Vigyan, Gujarat Samachar, 16/1/1984. Author Mr. Ratibhai Patel).

Farm forestry to boost rural economy : The per capita income of the agricultural population at constant prices declined from Rs. 198 in 1950-51 to Rs. 195 in 1976-77. The per capita income of urban population has increased and as a result of this "opposite income" movement, some of the problems of the rural poor have become more able to absorb the surplus working force, for that emphasis should be given to village and rural industries through proper and efficient utilisation of natural, human and capital resources. (Nochiketa Das, Kisan World, May-1984.)

Pesticides Actions : Workers in pesticide industry are exposed to health hazards during manufature and distribution of large quantities of chemicals, says a study, conducted by Indian Institute of Occupational Health, Ahmedabad. The study revealed that a unit producing phosphorous group of insecticides showed that the workers had the general toxic symptoms like headache, weakness, fatigue, vomitting, nausea and stomach ache and skin, eye troubles. A report from Ultrecht, Netherland report of more than 10,000 persons poisoning. At a conference on Pesticides Actions Network (PAN) demanded the ban on the export of harmful pesticide to the third world from United States and Europe. PAN is a world side movement of ecologists and consumer organizations dedicated to limiting the use of pesticide in the third world countries. PAN says that the banned pesticides are sold in abundance in the third world.

(*Source*: INFORMATION, Feb. 84)

Pollution : A recent study by National Environmental Engineering Institute (NEERI), Nagpur, shows that Bombay is the most polluted city in India. Nearly, 1,000 tonnes of pollutants are emitted daily by the industrial units and some 3,50,000 vehicles in the metropolis. Other cities on the list are Delhi, Calcutta, Amedabad, Madras, Hyderabad, Jaipur, Kanpur and Nagpur.

Farm Wastes For Power Generation : About 40 million tonnes of agricultural wastes produced each year can be utilised to generate power to make at least the agro-based industries in the country's self-reliant energy needs. Power generation from the wastes is possible by using external firedturbines in conjuction with an atmosperic fluidised bed combustion to burn the biomass. A 100 per cent combustion efficiency can be achieved in this system.

(Times of India, September 12, 1984)

(...Contd. from page 1)

- The non-renewable energy sources cannot be long relied upon.
- Competitive market economy ading to tensions cannot remain the motivator and designer of production systems without leading to world wars.
- The ecological imbalances created by indiscriminate use of Science & Technology for quick profit, require man to redesign the whole economy with a long range view.
- The world can exist only as one people having congruent interests who are non-exploitative of Nature.

Thus we find ourselves at the hreshold of another turn in the human history of thisplaneteffecting policies radically. This demands the development of a cooperative, non-exploitative global family which acts from a long range view. Now if this is the New Age towards which the whole world has to move we too will have to follow suit. Actually India could lead the world in this new phase of development to move towards which the various countries will have different time lags as per their position in the existing order of things. The reasons for this optimism are many including :

(i) Indian economy is not based as much on the non-renwable resources and centralized, capital intensive systems as it is in the Western countries.

(2) At the same time unlike other third world countries, India is amongst those who have an S & T infrastructure on the basis of which it can work for the New Order.

The question of questions is whether India will make itself bold to break new grounds or will it be satisfied with following the so-called successful nations, the success of which is apparently short lived.

Devendra Kumar

(Contd. from page 3)

"Is no compromise with the industrialization possible without imperilling the ideal of self-sufficient villages?", asked Frydman.

"Oh, yes, "replied Gandhi. "Railways are there, I do not avoid them. Again I dislike fountain-pens, but just now I am making use of one though I carry a reed pen in my box. Compromise comes in at every step, but one must realize that it is a compromise, and keep the final goal constantly in front of the minds eye."

"When I trun from the busy West to the masses in the Indian villages", resumed Frydman, "I seem to be moving in a different wrold altogether in which stagnation reigns."

"Yes, so long as you look at the surface," said Gandhi. "But the moment you talk to them and they begin to speak, you will find that wisdom drops from their lips. Behind the crude exterior, you will find deep reservoir of spirituality. I call this culture. You will not find such a thing in the West. You try to engage a European peasant in conversation, and you will find that he is uninterested in things spiritual. In the case of the Indian villager. an age-old culture is hidden under an encrustment of crudeness. Take away the encrustation, remove his illiteracy, and you have the finest specimen of what a cultured, cultivated, free citizen should be."

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Published by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Editor : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001, Maharashtra, and
Printed at : Swatantra Bharat Press, Esplanade Road, Delhi-110006.

CIENCE FOR VILLAGES

ding a Bridge between the Science Lab and the Village Mudhut

No. 21. June 1984. Monthly. Annual Subscription : Rs. 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

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1 AUG 1984 C.F.T.R.I., MYSORE

A picture for rural technology network

India cannot rise till 80% of its population living and depending on the village economy does not develop. Today India is a leader of the Developing Countries of the world with its high development in Science and Technology (S & T) and modern industrial infrastructure. Yet, unfortunately, in per capita income it compares with the last ten of the poor countries. If only urban per capita income was to be taken into consideration, there is little doubt that it would show itself amongst the toppers of its group. Since the rural economy with its large population and low productivity is lagging far behind the developing urban industrial economy, we face the travesty of poverty in one facet and development in another fact at the same time. Our growth is thus imbalanced. S & T inputs have brought tremendous thrusts to production but the profits accrued have not reached the large masses. Hence it is imperative that growth along with social justice is made the aim of all future plans for development. Even the productivity increase, in agriculture and allied land based occupations, has shown a clear predeliction towards the comparatively more resourceful and affluent of the villagers. The majority population does not have the wherewithals to gain from the new agriculture techniques and thus have been further pressed down in the process.

Land alone cannot provide employment to all the village people for all the year round. The agricultural produce can only supply food, and raw meterials for industries which are mainly in cities. The village, unless it is industrialized to optimal capacity, will ever remain on the losing side of the game. This is similar to the situation of Third World Countries vis a vis the Affluent World. S & T must come to the rescue of the situation and provide tools to the village economy which :

(i) will help the lower strata of society to improve their lot.
(ii) bring new avenues of occupation for them.
(iii) help in the development of an agro-industrial structure in the rural economy.
(iv) lead to the reduction of the percentage and number of people living below the line of subsistence and
(v) bridge the gulf of disparity between the rich and poor on the land and remove regional imbalances in the urban and rural economies.

To achieve the above end, some concrete new steps will have to be taken. Few of these are indicated herein :

Field Agencies of S & T should be evolved and helped to grow through voluntary efforts in all the districts of the country but to begin with, in each geo-physical-cultural region of say 5 to 8 districts. These bodies should have a core term of scientists of various disciplines like bioscience, chemical engg., civil engg.

(*Contd. on page 12*)

from the labs

Anti-Sewage Water Plant: 'Coon Tail', a water plant that is commonly found in ponds, tanks, lakes and other stagnant water bodies in temperate and tropical climates, has been identified as being the most effective in treating sewage by scientists at the research division of the Tamil Nadu Water Supply and Drainage (TWAD) Board.

Studies conducted over the past two years have indicated that the plant, whose biological name is *Ceratophylum Demersum-1*, can remove the phosphate content in the water to the extent of 96 per cent and ammonia by more than 97 per cent. The BOD level (which measure the amount of oxygen in mg/litre that is needed to degradate organic matter in the sullage) is also reduced by 95 per cent making the waste water even potable. The turbidity value after treatment is found to be well within permissible limits.

Investigations on the plant reveal that the water in the pond, was crystal clear inspite of being polluted heavily by activities such as bathing, and washing by the people living nearby. The pond water also did not effuse the normal fishy odour and the local population had not contracted any skin disease, which is possible in people using pond water.

The plant is a slender, submerged, acquatic and an algal-like herb. It is rootless but has leafy branches sometimes modified as rhizoids (a rootlike structure which helps as plant to hold to a substrate). The leaves are dichotomously cleft into slender minutely toothed lobes much crowded towards the apex with the appearance of a 'Coon Tail', from where it gets its common name.

Its life cycle begins with the monsoon and flowers come a peak during January to April. In some places with perennial water sources, the flowers and fruits are found throughout the year.

Encouraging results : The research department, now headed by Mr. M. Subramaniam, is now studying the plant's efficiency in treating industrial effluents. Already, encouraging results have been obtained during experimenting with chromium metals. Other heavy metals are being tried out.

Another advantage with the plant is that purification of the sullage is high with low plant productivity rate. It, therefore, requires easy and less-frequent harvesting. (The Hindu)

New infant food : CFTRI has developed a new spraydried milk food for infants which is expected to enter the market soon.

Unlike other commercial formulae which contain about 22 per cent protein, the protein content of the new infant food is only 12 per cent: it also has an adequate level of essential fatty acids which can be easily digested by the babies. The level of protein and essential fatty acid of the product, when reconstituted with water, is similar to that of breast milk. (CFTRI)

Low cost rural latrines : About 92.4 per cent of rural households do not have proper latrines. The main hurdles are : the cost of putting up the facility even at community level, its maintenance, and a rational design including the construction of a cheap and durable superstructure.

The new system developed consists of a 100 cm × 80 cm hand-flushed water-seal latrines with tw leaching pits of 1 m^3 capacity each One pit is to be used at a time an the other one is kept in reserve. A pit lasts for about 48 to 72 month after which the second pit is connected to the latrine and the firs one is cleaned. The night soi changes into a useful manur during this period and can removed and used in the fields o vegetable gardens.

Fourteen demonstration latrine were built in village Mewad nea Roorkee in 1983, and one i Fatehabad (Haryana) in 1983 an six were built in Roorkee durin 1981-83. They are functionin satisfactorily. (CBRI, Roorkee

Cabinet type solar dryer : Th dryer working on solar energy i useful for drying marine and far products. Its components can b easily dismantled, packed an reassembled. Its design is simp and can be fabricated by sem skilled workers of rural areas aft a short training.

The solar dryer comprises of rectangular box, having an area 100 × 50 × 35 cm, with a inclined upper lid. It weigh about 50 kg and occupies abo 0.5 m^2 floor space. Its two spec features are : (i) a nylon wick collect and discharge condens water; and (ii) a detachable metal hanger fitted in the middle of t cabinet to increase the efficiency dryer. The hanger is made of sheet and metallic shavin obtainable waste from lathe oper tors. (The provision of the hang is important since it quickens t rate of drying by about 10%).

About 50 large size cocon cut into halves could be dried one lot in 48 hours. The dry period for red chillies and gra was found to be about 72 hours.

(NIO, Go

Geothermal Energy : The Powering Inferno

One major renewable source of energy does not come from sunlight. Geothermal energy comes directly from the earth's vast subsurface storehouse of heat. Like the sun's energy, that heat is the product of gravitational collisions, atomic reactions, and radioactive decay. Just as the sun will eventually cool, so, too will the earth. But meanwhile-for millenia- it can supply immence amounts of energy.

By no stretch of the imagination is geothermal heat today oil's equal or even wood's. The twenty countries that use geothermal energy for purposes besides bathing cull appoximately 0.5 exajoules of energy each Year, 60 percent of it in the form of direct heat and the rest as electricity. Although not yet a major component of the global energy budge', enough direct heat to meet the needs of over 2 million houses in a cold climate and sufficient electricity for 1.5 million houses.

Geothermal energy use is rising rapidly. Where resources are abundant and accessible, geothrmal power is already an energy bargain, usually less expensive than electricity generated by coal and nuclear power plants. If technological advances proceed apace, the few countries that have already committed themselves to geothermal development will be joined by dozens more.

Subterranean Fires

All geothermal heat Comes from magma-the molten rock that underlies the earth roughly 40-kilometer-thick crust. While temperatures typically increase only 25 degreee centigrades with each kilometer of depth, temperatures as high as 360°C are in some areas found close enough to the surface 2 kilometres to be reached with current drilling technology. These anomalous "hot spots" are also home for volcanoes, geysers, and hot springs.

Most geothermal activity occurs where two plates of the earth's crust meet, allowing the cauldrom of fire to reach close to the surface.

As a result, the world's geothermal riches include the area where the mid-Atlantic ridge bisects Iceland, ar eas around the Mediterranean the Rift valley in East Africa, and the "Ring of Fire" that extends around the Pacific Basin. Yet even outside these areas, which comprise about 10 per cent of the world's land mass, are abundant lower-temperature geothermal deposits.

The world's geothermal resouces fall into four broad classes, each of which has unique problems and possibilites, **Hydrothermal Reservoirs** are found where permeable, water touching the heat source rises to the surface, cools slightly, and flows outward and down to be heated again. Over time this water reaches an equilibrium temperature, ranging from only slightly above that of groundwater to far above boiling. Lower-temperature hydrothermal reservoirs are widespr ead, whereas resources with water (or steam) over 150°C are limited to a few regions. A few hydrothermal deposits have sufficient temperature and pressure to yield dry steam, the most valued geothermal resourc e.

While hydrothermal reservoirs are the primary source of geothermal energy today the three other types of geothermal energy also have long-run potential. **"Geopressured" reservoirs** are formed when plant matter trapped in sedimentary basins decomposes and produces methane—the main component of natural gas. As the overlying sediments exert increasing force, the pressure and heat build. Such reservoirs are not as wide spread as conventional hydrothermal reservoirs, but in the US Gulf Coast and a few other areas they are abundant.

Hot dry rock and magma are the ultimate geothermal resources, but using either poses difficult problems. Utilizing hot dry rock found throughout the world will require developing novel heat-extraction technology since there is no naturally circulating water present. As for magma itself, tapping its heat will probably be confined to volcanoes and other geophysical anomalies that bring magma close to the surface. Technologies for using the hellish temperatures found at such sites have yet to be developed.

One spur to developing geothermal energy is the extent of the resource. The earth contains substantially more energy within it than humanity has used so far. Yet exactly how much energy can be tapped and where remain largely unanswered questions. Only modest geothermal resource surveys have been carried out until now. What these crude estimates do make clear is that geothermal energy is much more abundant than was once believed and is sufficient to allow a vast expansion in its use.

The Earth's Energy in Harness

Making use of the earth's heat is not a new idea. For millennia people have flocked to hot springs. Two thousand years ago both the Romans and the Japanese were relaxing in elaborate geothermal hot baths. By the ninth century Icelanders were using geothermal heat for cooking. In the Middle ages several towns scattered around Europe distributed naturally hot water to heat houses.

While geothermal technology has advanced far in recent decades, the simplest uses remain among the most popular. Japan's 1,500 hot springs resorts are visited by 100 million people each year, for example, and require no driling, little piping, and a minimal investment. Yet it would take five large conventional power plants to heat these baths were nature less obliging. In parts of Mexico people wash clothes with naturally hot water. Some Thais aad Guatemalans use it to boil vegetables and tea.

In the philippines and Kenya some crops are dried with low-temperature geothermal heat. In Idaho an aquaculture facility that uses geothermal water has found that the fish grow 25 per cent faster and seldom succumb to disease. The largest agricultural application is greenhouse heating. Hungary alredy has 70 hectares of geothermal greenhouses in use, while Italy is saving $600,000 of fuel oil a year by using several such greenhouses.

In scattered applications geothermal heat has also found a place in industry. In northern Iceland a mineral-processing plant uses geothermal energy to remove the moisture from siliceous earth. In New Zealand the Tasman Pulp and Paper Company relocated its mills during the 1950s to be near geothermal energy sources.

30 percent on energy, the company pockets and extra $1.3 million annualy now. At Brady's Hot Springs, Nevada, an onion-dehydration plant using geothermal energy is saving $300,000 per Year, enough to motivate the company's managers to expand the original plant and construct an additonal one.

Heating homes is the widest application of geothermal energy today. Since the turn of the century, the residents of Llamath Falls, oregon, have drilled, more than 400 wells to tap the 40 degree to 110 degree centigrades water beneath their houses for space-and domestic water-heating. Household wells there have heat exchangers that transfer heat from, the briny subterranean reservoir to the pure water circulating to the house. Using a heat exchanger conserves the resource, mimimizes corrosion, and skirts the problem of waste-water disposal. These systems cost from $ 5,000 to $10,000 and the onetime envestment can in many cases be shared among several households so that the life-cycle costs compare favourably with conventional heating options.

Further boosting the economies of shared systems, many communities have turned to geothermal district heating. The most impressive a example is Iceland, whose immense geothermal resources provide 75 percent of the population with heat. In Reykjavik, the capital, nearly all of the city's 112,000 people use heat from two geothermal fields under the city and from another 15 kilometers away. Visitors to this frigid city in the 1930s recall the pall of coal and wood smoke that engulfed it in winter. Today the air is clear, and home heating costs 75 percent less than it would using fuel oil.

astride geothermal resources, low-temperature district heating is an unbeatable bargain. Careful planning and major investments by a local government or special heating district are needed, but large fuel savings justify both. A few such systems are already in place in France, Hungary, the Soviet Union, and the United States, as well as in Iceland.

To boost the efficiency and, thus the economics of geothermal heating, some systems feature heat pumps. These electrical devices send a regrigerant, usually freon, through a series of chambers in which heat is extracted from one medium (such as naturally hot water) and transferred to another (such as air). If a heat pump is used, geothermal water at relatively low temperatures and even ordinary ground water can be employed for heating. 50,000 groundwater heat pumps are in use in the United States, and the National Water Well Association predicts that rural use will expand rapidly. This is bound to happen, especially if groundwater heat pumps can be adapted to provide cooling in the summer—an intriguing idea still being tested.

Even more popular than the direct use of geothermal heat today is its use in electricity generation. Small wonder. Moving hot water is expensive because insulated pipelines are expensive. Indeed, a 60 kilometer pipeline in Iceland is the world's longest. If converted to electricity, however, the energy in more distant geothermal sources can be put to use in cities and factories. Today approximately one hundred geothermal power plants of from 0.5 to 120 megawatts of capacity ate operating in fourteen countries. (*United Nations*)

Sesame—The Blessed Plant

Anybody who is familiar with the tale of Ali Aaba and the Forty Thieves will immediately recall the phrase 'Open Sesame' which is used as the password that opens the door of the robber's den.

Far older than the rale is the plant itself. According to Hindu scriptures, sesame was created and blessed by Yama, the God of Death. That is why, it is used especially in funerals and expiatory ceremonies as a purifier and symbol of immortality.

Seasum Indicum was originally grown in Africa and came to India and then spread to China in 1st century A.D. It is variously known as 'til' in Hindi and 'Nuvvulu' in Telugu. The plant is an annual herb 1—2m tall, with the seeds borne in a capsule about 2 cm long.

The capsule contains many small seeds which vary in colour from white, yellow, brown to black according to the variety. The seeds are very tiny and 100 of them together weigh no more than 0.2g. These seeds are eaten as a flavouring or as a food and come in useful for extraction of edible oil.

China is the largest producer of sesame followed by India, Burma, Sudan and Mexico. In recent times the production of sesame is decreasing, as a result of competition from soya bean peanut oils.

Sesame is raised mainly in monsoon without any irrigation in the sandy soils. Its ability to withstand drought or water absorption characteristic is of great significance. Harvesting of crop should be done when early formed fruits show signs of maturity which means that later-formed flowers contribute very little to the final yield. Among oil yielding plants it is the only one that can yield as high as 60% oil by weight.

There seems to be a correlation between seed coat colour and oil content—the lighter varities yielding more oil than the dark coloured ones. Oil from lighter coloured one is clearer and therefore superior. Nearly 80% of sesame seed production is used for oil extraction, 2% for planting purposes and remaining for direct edible purpose.

According to period of maturity, varieties may be early, medium or late. The commonly cultivated ones are black or white seeded. There are nearly 30 improved varieties of sesame that have evolved at various centres in India.

NUTRIENT COMPOSITION/100 g.

Protein	18.3 g.
Fat	43.3
Fibre	2.9
Energy	563 Kals.
Calcium	1450 mg.
Phosphors	570 mg.
Iron	10.5 mg.
Carotene	60 mg.

Around two-thirds of the calcium in seed is present as oxalate and trace elements present in seed include iron, iodine, zinc, cobalt, molybdenum and nickel. 65% of Iron in dehulled seed is in the available from. Sesame seeds are also rich in thiamine and niacin.

PROTEIN SOURCE

The seeds have acqired additional importance as a source of protein for human consumption. The principal protein is a globulin. There is no appreciable difference in the amino acid composition of proteins between black and white varieties of the seed. The limiting amino acid is lysine though it is rich in sulphur amino acids, particularly methionine. It is also rich in tryptophan.

The nutritive value of sesame flour is enhanced significantly by supplementation with lysine. Sesame protein constitutes a valuable supplement to pulse proteins which contain adequate amounts of lysine, but are normally deficient in sulphur amino acids. Its value as a supplement in raising the nutritive value of soya, ground nut and Bengal gram proteins and also their blends, has been demonstrated.

Absorption and utilization of sesame protein in young children havebeen reported to be similar to that from groundnut and cottonseed flours.

During extraction of oil, heat generated is reported to bring about a loss of available lysine in the protein. Mild heat, however, appears to improve the nutritive value of protein.

GINGELLY OIL

Unrefined sesame oil also known as gingelly oil is said to be preferred for edible use on account of its flavour. It is most resistant among vegetable oils to rancidity, especially after it is hydrogenated. The keeping quality of sesame oil is related also to its acidity. In gingelly oil loss of β-carotene is less than most vegetable oils and loss of added vitamin A in margarine stocks containing sesame oil is negligible.

Gingelly oil is as well digested and absorbed as any other oil or fat. In respect of aiding calcium and phosphorus retention, however oil is reported to be superior to groundnut oil. But, sesame seed and oil are costliest of major oilseeds and oils in India.

Traditionally seeds are soaked in cold water overnight, followed by partial drying and rubbing against a rough surface. Dehulled seed is used as food in sweetmeats, confectionary etc. *Ghani* presscake in Andhra Pradesh is used as an ingredient of hot curry preparations, in Middle East as *Tehinah* and *halawa*. In Venezuela, a beverage is prepared from toasted and crushed seed with milk and sugar.

Sesame is reportedly used in folk medicine, in caterrhal afflictions of kidney and bladder.

—*Girija Devi*

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When Tropical Forests Disappear

—Norman Myers

No community on Earth will be able to insulate itself from the consequences of an end of tropical forests.

All will be affected : an Eskimo, an aborigine and an Abominable Snowman. So would a lemon grower in Florida, a cancer sufferer in Australia, a chemicals industrialist in Japan, a camel driver in Egypt, a sampan dweller in Hong Kong and a fisherman in the Philippines.

Not many people are aware of the many ways in which their lifestyle depends on tropical forests But everybody's future is tied up with that of tropical forests. Our political leaders may not know it, or they are not telling us. Yet there are few environmental upheavals ahead that will have greater impact on humanity's welfare than the impending demise of tropical forests.

True, the forests are not gone yet. But if present felling rates keep up—and they could well accelerate—there may be little left by the time today's baby climbs into his rocking chair. Limited as is the forests' extent—they cover way under one-tenth of Earth's land surface—their disappearance will trigger reactions right around the world.

And the reactions will not only be environmental and biological. They will be economic, social and political. One of the few advanced nations to give the matter much thought, the United States, believes that it could emerge as an issue of "strategic interest".

First of all, tropical forests rank as the richest storehouse of species on earth. Several million species, not just tigers and orangutans but prickly plants and creepy-crawly insects, at least two in five of all earth's species. If the forests go, so do the species. When they are gone, they will be gone for good.

A perennial corn

In the mountain forest of Mexico, a weedy plant has recently been discovered, a wild form of corn, in fact, and a very special form. While all other kinds of corn are annuals (needing to start from seed every growing season), this one is perennial. This means that through cross-breeding, it could convert commercial types of corn into varieties that spring up year after year, just like daffodils. It will eliminate the farmer's costs of ploughing and sowing.

Because its forest habitat is often cold and damp, the wild corn plant appears immune to mildew, stem rot and sundry other problem that have hitherto limited corn-growing lands to warm areas that are not too damp. The wild variety also appears to be resistant to seven major diseases that cause havoc for corn growers around the world.

The ultimate economic benefits of this plant's genetic makeup could be worth billions of dollars a year. The weed-like growth had not been discovered earlier because it is confined to a few acres of Mexican forest, actually a patch that was being swiftly felled by loggers and squatters.

There is an impressive "shopping list" of economic benefits available from tropical forest species. So great is their economic worth, both actual and potential, that the tropical forest zone, confined as it is to a small sector of the Earth, raises all manner of political implications for those nations fortunate enough to have tropical forests, and those many other nations that wish to draw on their products.

Natural pest control

Citrus fruit growers in California, like their counterparts in many other parts of the world, must contend with dozens of insect pests that fancy a juicy lemon or orange. Some of these insects can be kept down by their natural enemies, such as wasps. Tiny rainforest wasps brought into Florida have already saved the citrus industry many millions of dollars a year.

Cancer Cure

As for cancer patients who suffer from leukemia, Hodgkin's disease or one of several related cancers, they can thank a tropical forest plant that they may survive. In 1960, a sufferer from one of these cancers faced only one chance in five of remission. Now, thanks to two powerful drugs developed from the rosy periwinkle in Madagascar's forests, their chances have jumped to four in five. Cancer researchers in the United States believe that there could be at least three plant species in Amazonia alone with potential to produce "superstar" anti-cancer drugs.

A genetic treasure-house

In an OPEC-dominated age, the petroleum price hikes affect us not only when we take a trip in our cars. They affect us even more when we use something made of plastic or any other petroleum-based material—as we do hundreds of times daily. Industrial scientists are now looking for alternative sources of raw materials for three petro-chemicals, and they are turning to the abundance and diversity of organic materials found in the Plant Kingdom, and especially in tropical forests.

So much for the genetic treasure-house represented by tropical forests. We also enjoy many environmental services from these forest, and we enjoy them through the forests' mere existence. For example, climate regulation. Now that the forests are being cleared, we are starting to realize just how much they contribute to the stability of climatic patterns around the earth.

When a patch of forest is cleared for agriculture, the pioneer agriculturalist—whether a small-scale cultivator or a large-scale stock raiser – clears his site by felling the trees aud putting a match to them. The result is that vast stocks of carbon are released from the wood, and dispatched into the atmosphere in the form of carbon dioxide. For sure, today's atmosphere gains a lot of carbon dioxide from the combustion of petrol as well.

But because of the same greenhouse effect, North America could receive less rainfall—with all that implies for that continent's "bread basket", and for millions of hungry mouths around the world. At the same time, the Soviet Union may find itself able to extend its wheat range far into Siberia—with all that implies for rivalries between East and West. The Middle East may find itself wetter—with all that implies for the Arabs' political muscle at a time when their oil wells will be running dry.

If the Earth's climate becomes warmer still, we may eventually witness a melting of the polar icecaps. This will lead to a rise in sea levels of between 5 and 8 metres. By that stage of the future, there will probably be at least one billion people living along coastlines.

If the political leaders in London, New York, Tokyo, Rio de Janeiro and Jakarta have ignored the warning warming signals, they will find themselves getting their feet wet. Fortunate will be the sampan dwellers of Hong Kong, since they will simply rise with the swelling waters—but they will surely not escape the political dislocations that will ensue if many millions of Chinese find themselves with less living space.

Indeed, no community on Earth will be able to insulate itself from the consequences of an end of tropical forests. True, an Eskimo may not object too much in terms of his daily lifestyle. He may be able to shift from subsistence hunting to growing of crops. But he, like everybody else, will not avoid the seismic tremors that will shake the political foundations of the global community. As we have seen, the economic repercussions will be widespread, whereupon the political fallout could eventually be as great as anything we can envisage short of nuclear war.

(IDRC FEATURE)

BOOK WATCHING

The seventy-plus nuclear reactors operating in the United States contribute less to end-use energy than does wood. And wood, together with all other forms of biomass, contributed only one percent of the 208 billion GJ consumed in developed countries in 1978. Forty-five percent of that total derived from oil.

In the Developing Countries, however, where more than twice as many people use less than half as much energy, biomass is the largest single source, contributing 43 percent of the 92 billion GJ consumed in 1978—nearly twice the share of oil. In some hard-pressed nations, such as Tanzania, Ethiopia, and Nepal, reliance upon local biomass energy sources rises to over 90 percent. For the vast majority of the population in developing regions, the primary sources of energy for cooking, heating, and even some forms of industry are the traditional biomass fuels: wood, charcoal, crop residues, and animal dung.

But the role of biomass is now in jeopardy, according to D.O. Hall *et. al.*, in the recent publication, *Biomass for Energy in the Developing Countries*. "In many regions of the world today," they warn, "supplies of fuel can no longer meet demand in an ecologically sound and sustainable way". The symptoms of resource overuse are becoming endemic: woodlands in and around population centers are being depleted: forest areas are increasingly encroached upon; and, agricultural residues and animal dung are being diverted for fuel, depriving productive lands of needed nutrients and organic matter.

The use of biomass as a fuel is just one of several pressures on this resource. Opening tropical forests to agriculture, uncontrolled commercial logging, and overgrazing all take their toll. Adding to the problem is a decade of increasing prices for petroleum-based fuels that has forced many users of kerosene and bottled gas out of the commercial energy market and back to traditional fuels. If this drives up the price of traditional biomass-based fuels, the poorest groups in developing countries will suffer the most. To keep locally-grown biomass fuels within their financial reach, highly efficient, environmentally sound ways of producing and using biomass must be found. Further, if the oil-importing developing countries are to curb their mounting international debts, they need to substitute indigenous energy supplies for imported petroleum. In spite of the current pressures on biomass resources, their use must grow, not diminish.

A variety of options

Photosynthesis captures 3×10^{21}J each year—about ten times global energy consumption. Even though much of this is inaccessible or absorbed in food production, Hall and his co-authors maintain that there is a "wide variety of options...for expanding the use of biomass energy." *Biomass for Energy in the Developing Countries* divides these options into three principal categories: energy for domestic needs, energy for rural development, and energy for petroleum replacement.

Meeting domestic energy needs in developing regions, according to Hall, means increased biomass fuel production and improved fuel-use efficiency. The technical solutions surveyed include: better use of existing forest resources, commercial and village-scale agroforestry, more efficient charcoal production, improved cooking stoves and increased use of biogas. Rural development needs are principally mechanical energy, which biomass can supply through gasifiers, biogas converters, or steam engines, liquid fuels. Biomass can replace petroleum by providing industrial heat, electricity. and liquid fuels.

Biomass for Energy treats each of these topics consistently, including: a concise, up-to-date introduction to the technology, an overview of the end-uses it can accommodate, an assessment of its potential, a review of ongoing pilot projects or national programs, and a thoughtful discussion of implementation problems.

In a book of just over 200 typescript-format pages, Hall's coverage of the issues is only possible with some sacrifice of detail. *Biomass for Energy* is clearly intended as a general reference work that draws upon, without duplicating, the host of monographs and technical journals this burgeoning field now supports, Nonetheless, even the specialist will find something new in the book's strongest sections, notably the thermo-chemistry and bio-chemistry of biomass conversion technologies and end-use systems. If *Biomass for Energy* has a weakness, it is its treatment of rural development. Because development is so vaguely defined here, the authors leave themselves with little to discuss but shaft power and the heating requirements of rural industries. The debate over what "development" really is, or should be, extends well beyond these issues, and possibly beyond the intended scope of this book.

Reference:

Hall, D.O., G.W. Barnard and P.A. Moss

1982 *Biomass for Energy in the Developing Countries.* Available for $20 from Pergamon Press Ltd., Headington Hill Hall, Oxford O×3 0BW, England: US office—Maxwell House, Fairview Park, Elmsford, New York 10523.

—Charles Drucker

(Soft Energy Notes)

WINDOW TO THE WORLD

120,000 varieties of rice in world :

Experts believe the world has at present 120,000 varieties of rice, many of which are facing extinction due to land development or deforestation. The International Rice Research Institute, Philippines has collected in its gene bank nearly 70,000 varieties and has launched a Five Year Plan 1983-87 to complete the collection so as to preserve for posterity the fruits of thousands of years of natural and human selection.

(TI 24/3—p. 13)

Honey the healer of wounds :

For ages mankind has valued the honey as a nutritive substance with certain therapeutic properties when used orally. But experiments in Thailand have revealed its hitherto unknown ability to heal external wounds.

It was observed during experiments that the bacterial counts in the infected wounds decreased remarkably after the application of honey.

(IE 26/3—P. 6)

Making straw more easily digestible :

A low cost technique of making straw more digestible for cattle and other animals by moistening it with car battery acid has been developed by Australian scientists. Small quantities of sulphuric acid are poured into the straw or bagasse and left to dry in the open for a few weeks. It can then be fed to cattle as an easily digestible and nutritious feed.

(HT 17/3—p. 13)

Solar refrigerator for villages :

The Energy Technology division of the Asian Institute of Technology, Bangkok, has developed a village-size solar refrigerator with a collecting area of about 25 sq.m. (12 collectors with a collecting area of approximately 2 sq.m. each) which provides 0.5 cubic metre of food storage space below 10°C or makes 100 kg of ice per day under favourable conditions.

The liquid seal system incorporated into the refrigerator enables it to operate automatically.

An intermittent ammonia-water absorption cycle is used in this system. Solar energy collected by solar collectors boils the ammonia solution (46 per cent concentration) contained in them. Liquid ammonia is condensed in a condenser immersed in a tank of stagnant water and collected in a receiver. The cooling effect and absorption of ammonia takes place in the evening when the temperature falls.

(THE HINDU)

Birth-control by breast-feeding ?

—Breast-feeding is an effective form of contraception provided it is done for more than 60 minutes a day.

In a study conducted at the Medical Research Council in Edinburgh, it was discovered that mothers who breast-fed their babies more than 60 minutes a day did not ovulate.

The study also showed that mothers who bottle-fed their babies resumed their menstruation an average of eight weeks after birth, and ovulation began after 11 weeks.

In contrast, breast-feeding mothers menstruated an average of 33 weeks after birth, and ovulated 36 weeks after that.

Dr. R.V. Short, an expert in reproductive biology at the University of Monash, Australia, in a magazine "Scientific American" said that in a great majority of breast-feeding women, the ovaries are inactive for most of the period of lactational amenorrhea, that is, the period when nursing mothers do not menstruate. (THE HINDU)

points to ponder

4.7. p.c. employed as child labour

Of the total population below the age of fifteen years in India 4.7. per cent is employed as child labour, according to the International Labour Organisation. This percentage is less than that of some other countries. The minimum age for entry into employment of children has been prescribed also exists for paying a minimum wage to a child worker employed in consonance with the law.

(I.E./18/4 P. 5)

30 children die every minute :

Every minute 30 children die for want of food and inexpensive vaccines and every minute the world's military budget consumes 130,000 dollars of the public kitty. The cost of a new nuclear submarine equals the annual education budget of 23 developing countries with 160 million school-age children. These are described in the latest annual estimate of world military and social expenditure brought out by the Washington research group 'World Priorities).

Pulses Crisis

In the Indian diet, pulses have a very important place, they being the chief source of the much needed protein. But every year their prices, especially of the tuar which is most widely consumed, have been steadily increasing and consequently their proportion in the diet has been decreasing. Tuar dal is presently priced at Rs. seven per kg in the city and at Rs. nine per kg. in Bombay. Obviously at this prohibitive price only the well-to-do can afford to have the dal in the required quantity in their meals.

The reason for the worsening pulses situation is that during the past three decades their production has miserably failed to keep up with the increasing population. In 1951-52 the country produced about 8.3 million tonnes which worked out to roughly 24 kg per head of the population. The year 1964-65 recorded the highest production which was 22.4 million tonnes and the per head figure came to 47.2 kg. The years that followed never equalled this figure and averaged ten million tonnes per year. In 1982-83 the total production was 11.5 million tonnes and the per person figure was 16.7 kg. The per head figure is naturally deceptive since, because of the acute poverty of the majority of population, the annual per head consumption of pulses by the masses must be much less. The adverse effect of such a poor intake of protein, particularly on pregnant women and children, can be quite severe and far-reaching.

This is not to say or suggest that the Government is not alive to the problem of the pulses. But legume (pulses bearing) plants present certain difficulties in achieving a breakthrough in their present static yield unlike wheat which could be mutated easily for bringing about the green revolution. A legume plant has bacteria bearing nodes on its roots and these bacteria absorb nitrogen from the air which is essential for the growth of the plant. Irrigation and use of chemical fertilisers inhibit the growth of the bacteria.

Agricultural scientists are presently busy developing new mutants of the legume plants which can give better yields but not much success has been reported so far. Consequently the availability of pulses continues to be poor. The only way out in the circumstances is to appreciably increase the area under the cultivation of the pulses. In Punjab much of the land that formerly produced lentils has now been diverted to the cultivation of wheat which is far more profitable. But it is necessary in the interest of the nation's health to make a determined effort to bring more area under the cultivation of pulses. Without an extensive farming of the pulses the situation will continue to worsen and a day may come when to the hungry millions pulses will become a prohibitive luxury.

(Contd. from page 1)

mechanical engg. and other branches. They would work shoulder to shoulder with the artisans and craftsmen of the area and involve the rural youth along with them in(a) identification of the techniques available with S & T generating institutes which can be suitably transfered to benefit the poor, (b) work on optimization and transformation of the available technology into an assimilable form and (c) after proving the technological and sociological viability of the technique give it a shape by which the technique becomes a trade and the process—a profession for the weaker section of the community. In this, it will take into consideration the existing networking of the Small/satellite, Mandi/medium and Big/bazar villages with their complementary roles. Many voluntary bodies of such type are already existing which could be encouraged by providing them with long time support and assisting new ones of the type to develop. *In the next five years 30-40 such field agencies be helped to develop which will act as conduits of S & T between the labs of the nation and its mud huts.*

The S & T generating instts. like the national labs, the IITs, the universities, and the engg. instts. etc. are basically geared to high and more sophisticated spheres of technology with priority on 'Frontier Fields' and lack any interface with the immediate problems which the common people of the land face and to the solution of which S & T could lend its helping hand. The scientists too, in heir hierarchy, consider those who tdeal with rural problems as lower or inferior and thus do not encourage them. The country is deprived of the most talented and ambitious of scientists who got to settle abroad. Villages of these scientists are in the country but they have no interest in their problems. Thus as we want to encourage our talents abroad to serve our country, we should create conditions by which our own scientists here work for the villages *This requires two measures : (i) from the resources at the command of any S & T instit., some proportion, say one-tenth, should be earmarked for the fulfilment of the objectives as detailed earlier and (ii) the scientist whose researches bring about positive results in the life of the masess must be given recognition and incentives of the same order as given to those making break-through in high technology.*

Among the scientists there are always some people with an element of idealism, who would be prepared to sacrifice to some extent to get the satisfaction that their efforts are helping those who need it most and are the weakest. This is inculcable more in the youth and so the young scientists prepared to take up rural technology as their sphere of activity should be encouraged to do so and institutional support be provided to them. Similarly, among the retired senior scientists there may be some who would be prepared to give the benefit of their experience in this important field and who will need to be supported and assisted. *The removal of the bane of wide spread poverty in India should be one of the prime objectives of the scientists and all efforts be made to involve them in this through attractive and practical support programmes.*

The picture emerging from such a change in the S & T planning could be something like this. There would be field agencies (F.A.) in every 4-10 districts which will be backed by the S & T instts of research in that area. The F.A. will have close links with each other and will be fed and nurtured by the national labs and S & T instts. to whom they will give the feed-back as well as take the work of transfer of technology themselves. A net-working of S & T organizations to help villages will grow. The culture of S & T in the country will thus gradually imbibe the rural technology innoculum and develop accordingly. This will result in a new set-up where the rural-urban divide will slowly dwindle and a synthesis of the two will evolve.

Devendra Kumar

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Published by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Ediior : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001, Maharashtra, and
Printed at : Swatantra Bharat Press, Esplanade Road, Delhi-110006.

F.D-56
204

SCIENCE FOR VILLAGES

lding a Bridge between the Science Lab and the Village Mudhut

. 86 Nov. 84 Monthly. Annual Subscription : Rs. 15/- (10 dollars) Individuals and Rs. 25/- (15 dollars) Institution

Mrs. Gandhi—A Tribute

Apart from being the Prime Minister, Smt. Gandhi always held the charge of the portfolios of science & technology, atomic energy and space research. This was in tune with the policy set by the PM—Pt. Nehru. The Prime Minister also addressed the annual gathering of the Indian Science Congress in the last weekof every year. All these could be taken as a routine part of the responsibilities but Indiraji did not look at it this way. She was very actively engaged in applying her mind to these subjects always trying to give them new orientation.

She naturally had a fascination for and great hopes in the areas of high technology which could bring India closer to the achievements of rich and strong nations. And she did not hesitate to invest highly in such fields as were considered the frontier areas of high technology. This was necessary to keep up the position of the country in the competitive world. India today is therefore not far behind in any of the facets of science & technology, as being developed the world over. We possess an infrastructure for technology innoxation and application as could, as needs be utilised to develop any and all the disciplines.

However along with this traditional approach to technology which is probably necessary, Indiraji kept an open eye to all new ideas that are knocking at the doors of the older concepts. She invited such people to keep herself abreast with the latest trends. She met and talked at great length with world thinkers like E.F. Schumacher and Ivan Illich. She was of the view that as things stand we will have to work at both the planes—that of high technology along with that of new technology which aims to fulfil environmental ecological constraints as well as ideals of social justice to assist the underprivileged and ultimately work for a long-range strategy for the fullest flowering of the human spirit in its pristine form.

Indiraji was first amongst the heads of the governments of the world who put up her voice in favour of environmental concern at the Stockholm Conference in 1975 and again for Renewable Sources of Energy at the Nairobi Conference in 1982. She implemented the two commitments made by starting the debt of environment and the department of non-conventional energy sources in the Central Government and undertaking national programme in both these critical areas of development. These are only instances of the priorities. She instinctively gave and in which she has left an indelible stamp of her personal concern, which the nation, we hope, will continue to carry on with equal vigour.

In the controversial area of rural application of science and technology, the usual thinking seems to be that the villages are backward looking habitations which could do with whatever technology is available for them and that the scientists of the day need not unnecessarily spend their time and energy to solve rural problems when a whole new vista of challenges calls for their untiring efforts to keep the country at par with the progress of technology as being discovered and utilized in the West and that the superior knowledge of scientists need be used specifically for the expert field for which they are meant. Indiraji tried to put things right. She soon realized that this mode of thinking may bring some excellence in research but the large masses of our people will remain unaffected by it. She wanted scientific bodies to react to the problem of poverty and deprivation in the land and interact with the problem of the poor in the villages. Her concern for the weak was evident in this. In 1976 Science Congress at Waltair, she forcefully pleaded for technology

(*Contd. on page 12*)

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

INSTITUTIONAL BIO-GAS

Under the auspices of the Trichy Sarvodaya Sangh, Trichy, a 60 cu. m. institutional bio-gas plant was installed in the hostel premises of the Faculty of Agriculture, Annamalai University, Chidambaram (T.N.), at a cost of Rs. 1,00,000.

It will be fed roughly with 1.5 tonnes of fresh dung daily which is obtained from the cattle dairy and will produce 2120 cu. ft. gas everyday which will be used for cooking meals for 300 inmates of the hotel. Thus the gas will replace the consumption ef conventional fuels such as firewood and coke valued about Rs. 6,000 per month. Considering the cost of Rs. 1,000 per month in maintaining the plant and handling dung, it is likely to result in a net saving on fuel charge of Rs. 5,000 per month.

SOLAR BASKET

The basket is made of bamboo and smoothened over inside with special papier mache (2 kg. wheat flour, 1 kg. methi powder, 5 kg. paper pulp.) and the basket is formed over a precise parabloid mould made from cement concrete or plaster of Paris. The smooth inner surface acting as reflecting parabolic mirror. The focal point of about 20 cm. rests in the centre. A tripod of bamboo poles is used to suspend thc cooking vessel with a rope. The basket is adjusted according to the position of the sun. It is claimed that it takes 3 minutes to boil 1 litre of water, 15 minutes to cook rice and 30 minutes to cook dal or chicken curry. It works from 8 a m. to 4 p.m. on sunny days. It costs Rs. 60—130 to produce the basket.

A BULLOCK-DRAWN IRRIGATION PUMP has been developed at Daudi Engineering works, Sambhal (U.P.) for small and marginal farmers. device is essentially a combination of reciprocating pumps with a common outlet and a common inlet connected to the water source through a base pipe. It can draw water from a depth of upto 8 m and can give 13,650 1/hr of water when operated by a pair of bullocks. The pump is workable on upto 10 cm. diameter boring (to pump out underground water) and can also be operated over wells, ponds or rivers, using a 10 cm. diameter hose pipe.

MECHANICAL GROUNDNUT STRIPPER

Department of Farm Machinery Tamil Nadu Agricultural University, Coimbatore has designed and developed a horizontal drumtype groundnut stripper. This machine has been designed in such a way that a village artisan can fabricate it in a local workshop. It consists of Stripping drum ; Blower for cleaning the foreign materials; H2 H.P. single phase electric motor and a cover to avoid shattering of pod. A cylindrical mild steel drum of 40 cm. diameter and 150 cm. in length, mounted on a frame for easy rotation is called the stripping drum. Around the periph ery of the drum six numbers of the wooden reapers (4×3×150 cm.) are fixed lengthwise. Wooden screws of 2.5 cm. long are fastened at 20 cm. interval over the length of the reaper. The protruding height of the screws is 1.3 cm. and the remaining 1.2 cm. is screwn inside the reaper. The wood screws along with the reaper on the drum form the stripping mechanism. This drum is rotated at 300—400 r.p.m. by a 2 H.P. electrical motor.

Organic Wastes: An Energy Source

A high level of agriculural or industrial productivity can be attained by a country when it is able to harness energy equal to many times the total muscular capabilities of its members. Thus, the developing countries like India must develop their own energy resources to offer high standard of living to its people. More energy is needed for two reasons : (1) the world population is growing at an exponential rate, and (2) energy use per capita is steadily increasing, because petroleum and certain other energy sources are limited, the energy base for continued development must shift to renewable sources.

Organic residues consist mainly of carbohydrates : cellulose and ligin, from photosynthesis, or sugar -and food-processing wastes. The conversion of cellulose or ligin into energy provides about 45000 Kcal/Kg of dry matter (oil yields 10000 Kcals/Kg). Another component of this residue is water. The moisture content in residues varies from a few percent in straw to more than 90 percent in slurry, sewage or other liquid wastes of the food-processing industry.

Since these materials possess low density, they occupy a large volume as compared to all, the handling of organic materials for conversion into energy is costly. But looking to the present and future energy situation, we will have to go in for such processes.

Dry organic matter, such as plant residue, normally contains 16.2×10^7 Joules/Kg. The present annual production of biomass on the land area of the world is 10^{11} metric tons of dry matter, This is an energy equivalent of six times the current worldwide energy consumption. Energy can be extracted from dry organic matter by numerous processes, which have been described in this paper later.

Availability :

There are major waysto obtain biomass for use as energy source : (a) to collect by-products of wastes, (b) to grow a crop for that specific purpose. Collecting residue is more practical. wastes are sometimes concentrated in one place, like industrial by products are collected for environmental reason (urban refuse, manure etc) in these cases the cost of collection for energy conversion is low but often the dispersion and the periodic availability of these raw materials limit their use.

Wood

Wood, the first fuel used by man, accounts for about 6% of world energy consumption today. The total amount of all woody material used annually for fuel is about 14000 million cubic metres, the equivalent of 300 million metric tons of oil. This is about half of the total world production of wood. Wood is either used directly as fuel after natural drying or transformed into charcoal where shortages exist. An estimated 95 percent of the households in the developing countries where wood is readily available use it as a primary fuel for cooking and heating.

Wood by-products :

Bark and branches become byproducts when wood is processed. Processing also produces large quantities of saw dust. Waste materials supply much of the fuel required by mills ; but often they are only incinerated.

Food processing refuse

Major food-processing wastes such as groundnut shells, coffee husks, cane cotton husks, coconut husks, rice hulls, olives, oil-palm ears, oil-palm fibres und husks are the important food by-products. As concentrations of wastes need to be destroyed anyway, they might just as well as be converted into energy.

Crop residues

Cereal residues (especially straw from rice wheat, barley and maize) provide good possibilities for energy production, with a potential of 495 million metric tons oil equivalent. Their conversion to energy is currently limited by alternative uses, as for fertilizers or animal feeds, and by collection and transport costs.

Animal excreta

Most animal species excrete daily about 1 to 1.5 Kg of dry matter per 100 Kg of live body weight. Most excreta, often mixed with agricultural by-products to form compost, are returned to the land to improve the physical and chemical structure of the soil. However, in many developing countries including India cow dung and other non-dried excreta are burned as fuel. In India, dung and agricultural wastes account for 22 and 35 percent respectively, of the total energy consumption. Through biogas, it is possible to extract from mannure with increased amount of fertilizer value.

Urban refuse and sewage

The collection of urban refuse and sewage is necessary for environmental and sanitary reasons. Urban refuse has a moisture content of about 50-60 percent, and gives off 1500-2000 Kcals/Kg when burned. An alternative use, composting, may be more attractive for cities.

Ocean kelp

The harvesting of plants from the sea has enormous potential. The giani kelp, a sea wood, is abundant, accessible and capable of biological conversion to methane. It commonly reaches 70 metres in length and grows two-third of a metre or more per day. It is native to waters with average temperatures of less than 20°C. Fresh kelp is about 80 percent water and consists of about 70 per cent volatile matter. A simple digestion system yields 0.41 cubic metre of methane per Kg of digestible organic matter. There is a large potential of kelp in Indian oceans.

Water hyacinth

The water hyacinth is a growing aquatic weed. It has presently spread to about 50 countries in the world. One hectare plant yield 360 to 480 tones of waterhyacinths yield of biomass which can be rated as one of the highest. Studies have shown that one hectare of water hyacinth can produce sufficient biomass to generate about 58400 cubic metre of biogas containing 35100 cubic metee of methane. In addition, one hectare hyacinth can provide about 100 to 110 metric tonne of fertilizer which can be applied to soil.

Conversion processes

Energy conversion can lead directly to heat production or to Intermediate fuels (solid, liquid, gas). The two major methods of conversion are (1) dry process in which the material is transformed under high temperatures, and (2) wet processes, which involve biological processes such as fermentation.

The reaction of air or oxygen gives off heat. The speed of the reaction is highly influenced by temperature. Some of the dry processes are as under :

(a) Combustion

Combustion is the most common form of energy conversion, mainly because of the widespread burning of wood and animal excreta. Usually, heat produced by combustion is used for heating, domestic purposes or industrial applications. The hot water or steam released during industrial processes can be used to produce electricity and for heat. Well designed burners will permit high temperatures and clean combustion producing more output.

(b) Pyrolysis

Commerical pyrolysis processes were developed mainly for municipal waste, in which moisture content range from 30 to 70 percent. It can be used for converting energy from organic wastes.

Gas producers

Gas producers are most commonly used in conjunction with engines to generate mechanical power. For technological reasons (high temp, dust) the gases must be cooled and cleaned before being introduced into the engine which may be a spark-ignition engine or a diesel engine. The conversion of dry organic residue to cold, clean gas is 65-70 percent efficient. The generation of electricity with an alternator and a dual-fuel engine is about 45 percent efficient, delivering a combined efficiency of about 25 percent compared with the 30-35 percent efficieney obtained when electricity is produced with a boiler and steam.

Another major method of converting organic materials into energy is by biological means, such as fermentation, with eventual chemical treatment. Because micro-organisms are involved, wet processes differ from dry processes in two ways : (1) an aqueous environment is necessary, and (2) they are slow and depend on the nutrient conditions. Through fermentation, organic residues can be converted into liquid or gaseous fuels. The two most common means are anaerobic fermentation and alcoholic fermentation.

(a) Anaerobic fermentation

The direct digestion of organic residues by bacteria in an aqueous environment provides a combustible gas : methane. Furthermore, the residues from this process can be returned to the lands as a soil conditioner. For this reason, anaerobic fermentation has provoked considerable interest in many countries, although it is used mainly in India and the Republic of Korea. Biogas production is also an anaerobic fermentation.

(b) Alcoholic fermentation

The sugars present in many agricultural plants can be transformed into alcohol by fermentation. The starch content can also be transformed into ethyl alcohol. Organic residues do not generally have high sugar or starch content. The molecules of lignin or cellulose must be converted into sugars by hydrolysis. Two methods are used
(1) acid hydrolysis, with or witho
heating, and (2) enzymatic co
version of cellulose derived from
fungus, which is reported to giv
a better glucose yield as all th
cellulose in the organic material
transformed. Thereafter, the pr
cess continues through fermenta
tion of the sugars and alcohol di
tillation to produce alcohol.

Ethyl alcohol is a good liqui
fuel with a caloric value of abo
5600 Kcals/litre. It can be used
spark-ignition engines either alo
or mixed with gasolene withou
much change in the power outpu
Brazil has developed a large-sca
programme of alcohol productio
by cropping sugarcane and cassav
for this purpose.

Conclusions

The type of energy conversio
process chosen for obtaining fue
or heat from organic residues wi
depend on (1) energy needs, (2
where the organic residues ar
available, and (3) size of the con
version plant. A major concern i
choosing a process is conversio
efficiency. For example, as th
initial moisture content goes up, a
increasing part of the energy i
dry process is used to remov
water. Available dry processes ar
therefore not appropriate if th
initial moisture content exceed
50-60 percent because only abou
half of the potential energy i
recovered.

For wet product (70-90 percen
moisture content) only biologica
means can be used. Wet processe
require more volume for a give
production because the process i
slow and the material aqueous
Suitable nutrients and skill ar
needed to ensure the micro-orga-
nism's metabolism requirements
Another possibility is to reduc
the initial moisture content in the
products so that the more efficien
dry processes can be used. This ca
be accomplished by sun drying
mechanical dewatering or artifica
drying with heat.

If these industries can be established in the rulal areas of ou
country, the collection of material
will be easier and transporatio
charges will be less. Also, rura
employment would increase.

(Source : Kurukshetra)

Toxins in Food

Undesirable constituents in food pose health hazards of serious dimensions which are of great practical relevance to public health nutrition. These toxins could be naturally occurring, produced by fungal infestation, or contaminates due to accidental or intentional mixing with foods. Some of the major areas of research are :

(a) **Aflatoxicosis from Groundnut** : It is caused by a toxin, named aflatoxin. Owing to unsatisfactory post harvest storage conditions, in our country, aflatoxin contamination of groundnut is common. The liver is strikingly affected by aflatoxin. Malnourished animals suffering from deficiencies of protein, vitamin and riboflavin were found to be more susceptible to aflatoxin. The higher percentage of aflatoxin was present in the milk of animals, fed with higher percentage of aflatoxin. There is one variety of groundnut from Junagadh which is esistant to toxin elaboration. This variety is agronomically uperior and has more than an verage yield in oil. This character f resistance to the elaboration of oxin was stable in different agro-climatic and soil conditions. Cultivation of such varieties has therefore been recommended.

(b) **Argemone Poisoning and Epidemic Dropsy** : Outbreak of epidemic dropsy due to contamination of edible oils with Argemone mexicana have been occurring sporadically in several parts of India. The disease is characterised by gastrointestinal symptoms, oedema of face and limbs, erythema and in a few instances death due to cardiac arrest. Edible oil contains sanguinarine which is a toxic agent. Argemone oil, besides sanguinarine, may also be responsible for the toxic manifestation. A method has been developed for the detection of argemone in edible oils. This method detects contamination at a level of one ppm.

(c) **Mustard Oil contains Frucic Acid** : Deleterious effects of this acid have been reported. Animals fed with mustard oil showed sarcoplasmic vacuolation of right and left ventricular myocardium. Some animals also exhibited a variable degree of myocurdial fibrosis. The significance of this finding is to be examined particularly in those habitually consuming mustard oil.

Carcinogenic residues in edible oils could arise from subgrade solvents used in extraction process or due to deliberate or accidental contamination of mineral oils. A systematic study is in progress to examine that carcinogenic residues in edible oils processed by the solvent extraction process.

(d) **Lathyrus satives causing Lathyrism** : 'Kesari Dal' is less expensive than other pulses; therefore, is commonly used. This has given scope for adulteration. The continuous use of this pulse causes paralysis of leg called lathyrism, due to the toxin. A method has been developed to remove toxin from it by soaking it in hot water for two hours. Water is removed and pulse is dried. This method was found to remove all the toxicity.

Source :

National Institute of Nutrition,
Indian Council of Medical Research,
Hyderabad—500007 (A.P.)

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Rice : Multiple Uses

Rice is our main food and hence the principal crop of India with about 70 million tonnes of rice production stands second in the world today only after China. Thanks to Central Rice Research Institute etc. the yield of paddy has gone up from 20 to 30 qtls. to 50 to 60 qtls. per hectare within few years.

Village Level

By dehusking the paddy two products are derived (a) rice and (b) rice husk. This rice is not the polished rice hence is full of vitamins and minerals. The rice husk in our country is either used as fuel, or cattle feed or thrown away. But rice husk can be utilised as an important product which would cater to the needs of many of our industries as well as people.

Rice Husk

Rice husk can be utilised in the manufacture of activated carbon, an important material used for bleaching oil, glycerine etc. as carbon filter and also used in the manufacture of pharmaceuticals. While manufacturing activated carbon we get sodium silicate as bye product which is an important raw material for soap and adhesive industries. The method of manufacturing activated carbon from rice husk is very simple. After screening the rice husk it is soaked in caustic soda lye. The soaked husk is then heated to the temperature 750° to 900°C with the help of flue gas and steam. Finally it is washed by water to wash away sodium silicate, filtered and dried. Sodium silicate is then concentrated by pan evaporators and stored for despatch. It is estimated that two tonnes of rice husk would consume 200 kg. of caustic soda to produce one tonne of activated carbon and about a tonne of sodium silicate.

The second important product that can be produced from rice husk is Furfural. By distilling rice husk with dilute sulphuric acid, the pentose present in rice husk would yield three water molecules and furfural. Here also we get important byproducts like methanol and acetone. Furfural is used in different forms for manufacture of cellulose acetate, nitro cellulose, shoe dyes, lysine, synthetic resins, dipic acid and also used for extraction of Butadiene and lubricating oil besides being used as fungicide. Presently the demand for furfural is being met entirely from imports. This speaks for itself the need to utilise and bring into use the available raw material.

Yet another important product that the rice husk gives is Lympo, a cement substitute. By mixing rice husk ash with lime and gypsom we get a dry mortar called lympo which is a substitute for cement. Lympo is already gaining popularity in the present age when the cement prices are soaring high.

Rice

The main product after dehusking of paddy is of course rice. Rice can however be consumed as it is after dehusking. But for consumer appeal polishing of rice at times is required although it is discouraged generally by health experts as well as the Government of India since it causes not only the loss of foodgrain but also loss of precious and essential vitamins and minerals. However we may go for polishing upto the extent of 4 percent. On polishing the rice what we get is polished rice bran. Polished rice, however, can be consumed directly after cooking. Rice bran again gives two important products.

Rice Bran

Rice bran, if extracted, gives rice bran oil which is an important raw material for soap industry. Rice bran oil is also being used as an edible oil in some places in India but it is yet to be declared generally as an edible oil.

Thus our principal crop, rice is capable of giving us food, shelter, paper soap, animal fodder and many more innumerable items. That processing of rice should be done at village level is an important point to be noted.

(abstracted from the article 'The untold story of our principal crop' be G.K. Ghosh in Khadi Gramodyog monthly issue of Sept.'84).

TRYSEM—An Introduction

The Central Government's Science of Training of Rural Youth for Self Employment (Trysem) was initiated w.e.f. 15 August, 1979 with the principal objective of removal of unemployment among rural youth. The main thrust of the scheme is on equipping rural youth with necessary skills technology to enable them to take to vocations of self-employment.

It is proposed to train about 2,00,000 rural youths in every year in 5,020 and old blocks at the rate af 40 rural youths per block.

Selection of beneficiaries is based on income criteria i.e. the family having per capita income of Rs. 63 per month is selected or Rs. 3,600/- per year is considered for selection. The priority insection is given to the poorest famliies and only one beneficiary is taken from each family. Preference in selection is given to those who have aptitude for innovative and entrepreneurial activity. Priority categories for selection are scheduled caste, scheduled tribes, ex-serviceman. Persons accepted mode of training is through institutional training and master-trainers. In the non-institutional mode of trainee the training is imported through master-craftsmen, skilled artisans, industrial and servicing units, commercial and business establishment etc.

The financial assistance permissible under this scheme are :

Stipend upto Rs. 100 per trainee per month if free accommndation provided to the trainee. In case the period oft raining is less than month a daily stipend upto Rs. 4/- is given subject to maximum of Rs. 100/- per month. In case the training is conducted in the village of the trainee, the rate of stipend is upto Rs. 50/-. In case the training is held outside the training village and the accommodation is not provided free of cost the rate of stipend is upto Rs. 125. In such cases the rate of daily stipend for courses of duration of less than a month is upto Rs. 5/- per trainee. Training expenses upto Rs. 50 per trainee per month is given to training institution/master trainers.

A sum of Rs. 25 per traniing per month for raw material subject to maximum of Rs. 2,00/- per trainee is given to the institution/master trainer. A tool kit is provided to the trainee costing not more than Rs. 250/- per trainee.

(*Contd. on page 12*)

"Virtuosity
in any sphere—whether in the Arts or
the Sciences —depends upon the creative
freedom allowed to the individual. For
freedom allows latent talent to express,
itself—to explore new dimensions of
thought and action, unfettered by the
conventionality— to give
shape to innovations that change
the quality of life."
—An Excel Belief

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BOOK WATCHING

Fighting Back Against Beyond Disease :

Fireless cookery is an ancient technique. While it technically does use fire, it works mainly on the principle of retained heat, and requires less than half the fuel needed for conventional cooking.

Here is how it works : You fill a pot only two-thirds or three-quarters full (combining food and liquid). Then you put it over direct heat, but only for as long as it takes the contents to come to a simmer. Finally, you place the pot into a carefully insulated container and allow the retained heat to complete the cooking process.

Containers can come in a variety of forms ; they can be drawers, baskets, cardboard or wooden box—even holes in the the ground. The trick is to insulate them properly—with pillows, clothes, straw, leaves, sand—anything, really, that can be shaped to make a tightly fitting "nest" and is a suitably poor heat conductor.

Food cooked in this way loses less water than that prepared by regular means (no more steam escapes once the pot is in its container) and will remain hot and succulent for four to six hours.

(This material comes from an article by Heidi Kirschner in *Cookery News*, February 1983. Cookery News is available from Approvecho Institute : 442 Monroe Street ; Eugene, Oregon 97402 USA.)

Rice Husk Ash Cement

The Intermediate Technology Industrial Services (ITIS) Unit of the Intermediate Technology Development Group requested a review of the current state of this art of producing a cementitious material from rice husks in the Indian sub-continent. Discussions on research into the various processes were held at six institutes and visits were made to inspect the commercial enterprises utilising the process of each institute. The report discribes the discussions and site visits and a more detailed comparison of methods, properties of the products and economics.

Main conclusions and recommendations presented in the study are as follows.

Conclusions : RHA Cement can be made using simple technology not only on laboratory or pilot scale, but also as a commercial venture producting several tonnes of product per day. To maintain production, supplies of raw materials must be continuously available or stock piled. Power must be available especially for ball mills of oversize capacity to allow for these interruptions. To maintain sales of the product, especially when alternative materials are available, the RHA cement must be of a consistently high quality. It is best to burn husk at no more than 700°C.

Ash and lime : When particular local conditions permit, the basic mixture of ash and lime may be modified with advantage. The RHA cement has properties which make it suitable for mortars and rendering, that is to say for use as a masonary cement.

Recommendations : Incinerators for burning husk should allow plenty of cooling air which will also help to keep carbon content low. This is more easily achieved in small-incinerators than in large heap burning. The temperature should be limited 700°C maximum to avoid formation of crystalline ash. Heat generated by combustion of ash should be usefully employed for example for drying foodstuffs. The period of grinding in the ball mill should be adjusted to the minimum necessary to produce the required properties in the RHA Cement. Specially burnt ash should be soft and require less grinding but if ash is brought in ready burnt, has having already contributed its heating value in some process, longer grinding may be necessary in order to produce a satisfactory RHA cement.

(Ray Smith—"Rice Husk Ash Cement Progress in Development and Application".)

WINDOW TO THE WORLD

Bacterium Spurs Growth in Nutrient-poor Soil:

A recently discovered system of nitrogen-fixation by a bacterium that functions in soils deficient in molybdenum offers hope for legume producers around the world.

Over half the world's soils are deficient in molybdenum, an element considered essential if bacterium is to fix atmospheric nitrogen. The newly discovered bacterium, however, apparently operates in soils with only the alighted trace of the mineral. If it can be duplicated, the bacterium could be particularly valuable for boosting legume production in such of Africa and in such molybdenum poor highly acidic regions of Brazil.

'New' Foods From Lost Civilizations:

Perhaps as many as 500,000 plant species grow throughout the world. Yet humankind takes most of its nutrients from just 15—wheat, rice, corn, common bean, soybeans, peanuts, sorghum, millet, white potato, sweet potato, ryebarley, cassava, coconut and banana. Scientists today, however, want to add amaranth and quinua, foods that once fed millions during the time of the pre-Columbian Artec and Inca empires in America.

Amaranths are fast-growing cereal-like plants that produce high-protein grains in large sorghum-like seed heads. Their protein-rich leaves are already widely consumed. Before the Conquest, amaranth was the major grain crop in tropical highland of the America.

The National Academy of Sciences of USA is currently sponsoring a quarterly newsletter on amaranth research.

Nigerian Chewing Sticks Save Teeth:

One more folk remedy has been found to have a scientific basis. According to the *Nutrition Research Newsletter* (June, 1984), researchers from the School of Dentistry of the University of California at Los Angeles (UCLA) confirms that "chewing sticks," long used in Nigeria to control plaque and reduce the incidence of dental caries, do, in fact, contain properties that serve to accomplish that purpose.

The sticks are made up of portions of several indigenous Nigerian plants. When the scientists studied extracts from the chewing sticks, they discovered that it contains a compound, probably of the family of polyphenolic tannins, that slows the production of lactic acid and dextrams, both of which contribute to plaque and tooth decay, and inhabits the adherence of substances to the tooth matrix. In other words, keep chewing Nigeria!

African Plant Kills Bacteria:

Extract from an East African plant that people drink to ward off cholera protected mice from normally lethal injections of bacteria in recent U.S. laboratory lests.

The extract worked through an apparently "unique biological activity" which has yet to be defined according to Isao Kubo, associate professor of the University of California. The chemical structure of the extract is well understood, however, and could be "enhanced" synthetically, the researcher noted.

Kiubo said that the potency and simplicity of the compound, called maesanin make it worthy of further study as a possible model for new antibiotic drugs for humans.

Cholera, a widespread disease in East Africa, comes from bacteria that contaminates drinking water. Tetracycline, a widely used antibiotic, is commonly used to treat it.

Maesenin killed the E. Coli in laboratory dishes, and surprisingly the same small dose of maesanin exerted a measurably stronger effect when injected into mice.

Twenty-four hours after injection, it protected the mice subsequent lethal injections of E. coli. Mice that did not receive maesanin died soon after their E. coli injections.

Kubo said the maesanin apparently evoked a "non-specific host defense reaction"—non-specific in that it did not stimulate the production of antibodies in the mice.

"Nordid Maesanin acts like a typical antibiotic by preventing the bacteria from building their cell walls", he continued.

points to ponder

Diet is a major killer in the industrialised countries, causing a third to two-thirds of cancer and contributing to the heart disease that accounts for the third of deaths in the rich world. Shocked at this annual carnage many people are now beginning to change their eating habits. In the US, for instance annual deaths from cancer and heart disease have dropped by a stunning 30 percent. So it can be done. And here-with a few New Internationalist embellishment-is what you do.

Fill up with Fibre

Fibre-especially in the form of bran and beans-has been embraced by many slimmers in the vain hope that it will make the rest of their food pass through them too quickly to make them fat. Setting aside that rather revolting, immoral and wasteful idea, fibre in a healthy diet of whole foods makes a lot of sense.

A study in Holland found that the 25 per cent of people with the lowest levels of fibre in their diet were three times as likely to die of heart disease and cancer than the 25 per cent with the highest levels. Low fibre diets are associated with bowel cancer, diverticulosis, constipation, irritable bowel syndrome, Bowel cancer is the most common fatal cancer in the US and second only to lung cancer in the UK.

In addition to protecting against bowel diseases, a high fibre diet is thought to help cure up to 82 per cent adult diabetes, and help prevent atherosclerosis (from saturated fat and cholesterol in food) and gall stones. Eating more wholefoods also means you automatically tend to cut down on fat and sugar.

Recommended daily intake of fibre is at least 30 gm. Foods to aim for are (with gms per average serving in brackets) : pulses like beans and peas (6-16), spinach (7), wholemeal bread (6), sweetcorn (6), baked potato (5) muesli (4), broccoli (5) ; banana (3).

Stop the Sugar

We all know sugar is bad for our teeth. But in the rich world, where almost everyone has tooth decay, the disease is a relatively minor irritant. In the poor world, where dentists are rare, tooth decay and gum disease can lead to excruciating pain, acute infection and disfigurement.

But sugar is more dangerous as a cause of over weight because, like fat, it provides a lot of calories but not sense of fullness-so you eat a lot without noticing. Three lumps provide the energy equivalent of walking one kilometer. Sugar is also linked with adult-onset diabetes and heart disease. It is used in huge quanties in processed food and drink to create bulk, shape ond texture.

Worse still, it's worth remembering that sugar is grown instead of food in many countries with disastrous effects on local nutrition.

Recommended level is 11 kg per person per year : about one quarter of current average consumption in the rich world-and many parts of the poor world too.

MYTH : Brown sugar is less harmful than white.

FACT : It's all bad for you.

Save the salt

High blood pressure-hypertension is a major risk factor in heart disease and strokes. Overweight is an important cause of hypertension. Another is sodium. Japan, with the highest levels of salt (sodium chloride) in the diet, has levels of hypertension and death from strokes.

One quarter of all people are throught to be genetically predisposed to hypertension as a result of too much sodium. 10-15 per cent of the US population aged 35-64 have dangerously high blood pressure. Salt is also linked with stomach cancer-especially prevalent in Japan. In Belgium a government campaign to reduce salt intake led to a reduction in stomach cancer and strokes.

On average we each consume 4-5kg of salf a year-about 12 gm or 2¼ teaspoon a day. The recommnded daily level is just 5 gm and only 1 gm if you have high blood pressure. With the majority of our salt intake coming from proceseed food, the only sure way to cut down significantly is by cutting processed foods.

Foods to avoid : anything "in 'brine', 'smoked", self-raising' or containing disodium additives or monosodium glutamate, also preserved meat like bacon, shellfish, tinned breakfast cereals and biscuits.

(New Internationalist)

(*Contd. from page 1*)

to be purposeful for the villages. As Chairman of the Council of Scientific & Industrial Research, she asked all its labs to have an interface with the village problems and try to grapple with the technological problems that the villages face. Her concern for the new application of technology to strengthen the weaker links in the chain of the country's economy, found progressive expression in her policies. In the 6th Plan, at her instance, special programmes were included of 'technology for women' 'technology for scheduled castes, scheduled tribes and weaker sections' in the Department of Science and a new body, Council for Advancement of Rural Technology, is created in the ministry of rural development. In all the States of the country, councils of science technology were made with special reference to the technology to assist the common man. All these programmes were new additions to the existing order and had a new direction as well. Though the present force of the current is strongly in favour of the sophisticated and elitist tech and these steps will take time to affect it, the right forces have been set in motion. The late Prime Minister was not tired of repeating in all the forums of the scientists that they must not forget the masses of India, for whom all of us must work.

Now that we have lost this great soul who tried to help in the synthesis of the newer knowledge of science with the accumulated wisdom of the ages for the welfare of the humanity, we feel greatly forlorn. We however hope that the direction she gave us and the dynamism she brought about in this, as in the other fields, will be carried forward with all sincerity and that alone will be a fitting tribute to her loving and respected memory.

Devendra Kumar

A Solar Cabinet Dryer

Solar drying of agricultural products in open on platform either for preservation as seed food or feed is the simlpest cheapest and oldest practice in most parts of the world. If a little solar technology is applied considerable spoilage can be reduced and fuels and electricity consumed by the industries for dehydration can be saved. Moreover, a little extra cost involved by employing solar technology can be rccovered through increased profits from cash crops such as seeds, dehydrated fruits like grapes, dates, apricots, ber etc. and vegetables. The solar cabinet dryer fabricated at Central Arid Zone Research Institute, Jodhpur is essentially a solar hot box in which fruits Vegetable or other things can be dehydrated on a small scale. In essence it consists of a rectangular wooden box made of wooden planks (25 mm thick) with a base area of 1.5 sq.m. insulated at its base and covered with a clear window glass at a fixed inclination of 23 degrees from horizontal. Holes are drilled in the base to permit fresh ventilating air vent into the box. Outlet ports are located on the upper parts of cabinet side and near panels so that the humid warm air can escape through the upper side holes thereby creating a partial vaccum and inducing fresh air from the holes in the base. As a result there is a constant perceptible flow of air over the drying material, which is placed on perforated trays on the interior cabinet base.

Contd. from page 8)

The reward of Rs. 50 per trainee per course is given to master trainer for the successful completion of training by trainee.

During the course of training, the trainees are helped to prepare project reports, which are converted into bankable schemes. They are helped to apply for bank loans and subsidies. Subsidies given to the trainees for setting up of their unit is on the pattern of IRUP and have maximum limit of Rs. 3,400/- per trainee in all the areas excepting in DPAP area where it is Rs. 4,090. In case of tribal beneficaries the maximum limit of subsidiy is Rs. 5,000/-.

All the recurring assistance is provided from ICDP funds and is to be shared equally by the Centre and the States. There is a provision for strengthening of existing training infra-structure in the shape of construction of households, dormitories class-rooms and workshop accommodation, training equipment and aids. There is separate budget for this component of the programme which is Rs. 5 crores for 6th Five Year Plan. For Agricultural Universities Central Institution etc. the assistance is 100% by the Centre. In case of others, the assistance is shared equally by the Centre and the State.

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Published by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Editor : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha-442001, Maharashtra, and
Printed at : Swatantra Bharat Press, Esplanade Road, Delhi—110006.

F. D. 30 Library

SCIENCE FOR VILLAGES

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Dec. 84-Jan 85 Monthly. Annual Subscription : Rs. 15/- (10 dollars) Individuals and Rs. 25/- (15 dollars) Institution

Challenges of the new year

As the year 1985 dawns, the world seems to be in an uneasy calm. Human beings are very busy converting the advantages technology gave them in greater and greater productivity from the resources avaliable to them. These productions. are not necessarily geared to the requirements of the people but more often than not. pressurise the consumers to increase their so-called "standard of living by foisting on them new wants and greater consumarism. As the case of industrialised countries so also the other countries too try to copy and follow the same line because of the value system where the more one consumes the higher in status, one is considered to be ? The spiraling rise in production and consumption tells adversely upon the natural resources. These get depleted irreparably. Ecological balances are destroyed. Environmental problems are created. Large number of species of living beings are annihilated. The top soil of the planet, the fabric on which plants and assets on land depend is progressively damaged.

The tensions of such a production system are created not only in Nature but also on the community of human beings as well.

Between the various interests which go into conflict with the one between man and Nature are those amongst labour and management and consumer and producer, importer and exporter, individual and collective. Then again there are tensions between nations and nations and groups of nations. All these tensions are inter-related. The greater these tensions the more is the fear and insecurement felt. This leads the countries to go in for more and more destructive weapons of strong defence systems. The armament manufacturers cash on this fear psychosis born because of the original cause of a wrongly based production system. The super powers themselves are the resultant of the same fear between one nation and another.

The holocaust which the world faces should make us sit up and think as to how a change can be brought about in our mode of living and in the means of fulfilling our requirements from the Nature in a way that will not destroy but help Nature in its suplendorous growth.

This is true that the tensions between man and man are automatic reflections of the tensions that man creates when he deals with Nature in a destructive fashion. As plant and animal life gets destroyed, the soil gets depleted, the earth air and water polluted, the natural non-renewable resources become less and less, they create tensions in the human society. This is reflected at all levels of our economy and leads to peacelessness in the soul of man.

If the world is to survive, we must move expressly and immediately towards a system which can bring simbiotic relations between man's activities and natural cycles between individual and collective interests and between the aspirations of the present times and those of the times to come. This requires a bold resolve to undertake steps which may be initially hard but will yield ultimately happy results. This has to be done by each one of us in our individual life as well as by the corporate institutions at various levels. The 16 years that are left to us of this century should bring about qualitative changes towards the new direction which we could pass on to the 21st centry. If we do not do this we will be accused of having in the 20th century messed up things to such an extent that it would be difficult to amend them.

Devendra Kumar

The Bhopal Tragedy

On the night of 3rd December, 15 tons of lethal methylisocyanate gas accidentally leaked out of an insecticide manufacturing factory just at the outskirts of the thickly populated city of Bhopal—the capital of the State of Madhya Pradesh in India. The gas killed some 2500 innocent people of all ages within minutes and injured and maimed more than ten times that number. Incidently the factory was run by a giant multinational corporation.

The people are now talking about the need for more stringent safety measures in these factories and keeping them far away from human habitation. There is also strong pleading that M.N.C.s be prevented from lording over the poor nations which cannot speak up against their shoddy behaviour due to their money power. These and many more such reactions are being expressed on this one of the greatest tragedies in human history. But there is another way of thinking also.

Large-scale use of Poisonous chemicals in whatever context they may be used will, apart from disturbing the delicateco-systems, ultimately recoil upon man himself. Their use is morally wrong, ecologically absurd and in the long-run always harmful. In the mad race for greater agricultural production by any means at our command, we are goading the soil to produce more and more through artificial fertilizers and killing off all natural barriers in production like weeds and pests by obnoxious chemicals. If profit by any means is the goal, accidents like that in Bhopal are bound to happen. This great warning should touch the heart of the enlightened people the world over and should inspire then to evolve and stick to such methods of production alone which are in consonance with natural laws. When you look at things in a wider view, means and end cannot be distinguished. We will have to follow the ecological path to agriculture, pest control and management of soil fertility.

The question of multi-nationals should also be gone into dispassionately and lesson learnt from Bhopal. Most of the articles of daily consumption are to be produced in decentralised units manned and owned locally. The law seems to be that the greater the requirement of a commodity-more recurring in time and more quantitative in weight-the more decentralised should be its production. Things which are required for a small percentage of people and or are a one time purchase for a long time-span, come within the purview of centralized production and supply. When such articles become 'heavy' and 'sophisticated' (and their number will be very small) and require to be produced at one place from where they get supplied to many countries, the multi-national level is reached. However, MNCs must not be allowed to produce day to day needs like fertilizers and pesticides, soaps and cosmetics, foods and beverages and things of the order which can easily be managed in a decentralized fashion. The giganticism of production creates money power of and order that vitiates all norms-as probably happened in Bhopal. **—Editor**

Why the other half dies

Jon E. Rohde

About 17 million children from birth to age 5 died this past year. Thirteen million of them never even reached the age of 1 year. Children's deaths constitute one-third of all deaths the world over, and in the poor tropical nations, over half of all deaths. It is this "other half" that I speak of, for had those 17 million children who died this year lived in the UK, over 15 million of them would still be alive today. Children contribute 68% of all deaths in North Africa, while in North Europe or North America they comprise only 2 to 3% of all deaths. The difference is indeed enormous, but it has only recently become so.

In 1908, an infant mortality rate (IMR) of 23% (one out of every four infants dying before age 1) prompted the founding of a child health clinic in a municipal ward of this city where two years later, in 1910, Leonard Parsons was first appointed a clinician. Sir George Newman's analysis of infant mortality in England, published in 1906, had especially singled out Birmingham. Its city-wide IMR at the time was 195%. Eight wards had rates in excess of 200 ; St. Mary's had a rate of 331, and Edgbaston had a rate of 133, still above the rate of most developing countries today. It was cited as having "satisfactory conditions". Only 40 years later, at the time of Parsons' knighthood in 1946, the IMR throughout the UK had fallen to 25%, a mere 10% of that earlier level'.

The epidemiological dimension

Maurice King's excellent manual for health workers, *Primary child care*, has 26 chapters, of which 19 are devoted to a separate symptom complex or disease group : cough, diarrhoea and malnutrition head the list but numerous other chapters call our attention to fever, skin diseases, fits, eye problems, otitis, leprosy, jaundice, swellings. Jellife's textbook, *Diseases of children in the subtropics and tropics*, is even more exhaustive and more detailed—heat disorders, snakebite, schistosomiasis, trypanosomiasis, leishmaniasis, mycotic infections, all contribute to our impression, and particularly that of lay decision makers, that children in the tropics suffer from an infinite array of grotesque, exotic, and complex diseases. But even in the tropics many of these diseases are unusual and very often not fatal. A critical epidemiologic examination of the situation, rather than a collection of clinical diagnoses, shows that most deaths occur in the very young, before age 5, by which age the survivors have almost as good a chance of living past 60 as does a child today in Birmingham. Those 17 million children died last year succumbed to the same conditions that faced Parsons 70 years ago : 60 to 70% of deaths are caused by diarrhoea, pneumonia, and contagious infections (Table 1). Contributing to and underlying all of them is maluntrition. Common, undramatic, and far from exotic, these have all too often been ignored, indeed have been accpted as a normal and necessary part of growing up.

TABLE 1

Couses of death in infanis and children under age 5 years

	London 1903	Matlab, Bangladesh 1975/77	Haiti 1979/80	Java 1978	Narangwal, India 1971/73
Diarrhoea/enteritis	13	29	16	15	39
Pneumonia/respiratory	17	6	12	21	19
Malnutrition including low birth weight	26	=	33	22	5
Immunizable diseases :					
Tetanus	4	14	3	8	2
Pertusis	4	—	1	—	—
Measles	3	8	1	6	1
Tuberculosis	4	—	3	—	—
Other	29	57	31	28	34
Death rate per 1000	145	280	200	100	135
(age group)	(0-1)	(0-4)	(0-4)	(0-2)	(0-3)

(Source : George Newman, *Infant mortality, a social problem*, Methuen, Ltd., London, 1996 ; Jon E. Rohde, Child mortality in a rural Javanese village : a prospective study, *International Journal of Epidemiology*, vol. 12, no. 1. 1983, pp. 88-92 ; original data by the author.)

Diarrhoea and respiratory infections

Everone gets diarrhoea—true. Most survive—true again : WHO estimates a billion or more cases per year. But five million of those cases die, making diarrhoea the top killer of children. When does the ubiquitous cold become pheumonia, resulting in three to five million deaths ?

Immunizable diseases

Take immunizable diseases (Table 2). Many cases go unrecognized : pertussis is estimated to cause 600,000 or more deaths, but in offical mortality statistics appears only as a cough, perhaps occasionally as pneumonia, its importance masked by its misdiagnosis.

TABLE 2

Estimated annual deaths
from immunizable diseases in the world

	Incidence	Case fatality rate	Estimated deaths
Neonatal tetanus	15% birth	85%	1.0 million
Childhood tetanus (1-4 years)	10%	40%	0.2 million
Diphtheria	unknown	1%	unknown
Pertussis	80%	1%	0.6 million
Mearles	100%	2-8%	1.4-3.0 million
Tuberculosis	1-10%	2-3%	0.1 million
Estimated deaths per year			3.35 million

Neonatal tetanus claims a million lives a year, the tragic result of exposure to a ubiquitous organism in a filthy environment. Most go unreported, for in a world where life is so uncertain, few bother to report the death of a newborn.

Measles has long been classified in Western textbooks as a benign disease of childhood. Yet it is the major killer today among immunizable diseases, claiming over 1.5 million lives. When I joined a large paediatric department in Indonesia 10 years ago, I was assured that measles was not a proble in that country. Aware of the African experienc and the high prevalence of malnutrition in Jav and with occasional prodding from David Morle I began to see an occasional late case : brawn desquamation, keratitis, diffuse pneumonia, a atypical kwashiorkor. No one was convinced— "rare cases" they said. With a few colleagues began to watch the newspapers for strang epidemics. Five years and a dozen field investigations of measles outbreaks later, Indonesian paediatricians began to accept the importance of measle as a killer. Not only were the case fatality rate 3 to 5%, and in one epidemic as high as 14%, bu it became evident that increased risk of deat extended well beyond the acute illness. Dr. Stanle Foster of the Centers for Disease Control in Atlanta has documented continuing high mortalit following measles for up to nine months in Africa. Why were they not seen and counted before? Thes children die of diarrhoea, pneumonia, and malnutrition, like so many others. But a proper recognition of the underlying cause, measles, gives a vita clue to intervention.

The cycle of low birth weight, malnutrition, an illness

Poor foetal growth leading to low-birth-weigh babies is seen only in 8% or less of births in ou countries, but 12 to 15%or more of babies in th rest of the world weigh less than 2500 gram Deaths among them are frequent, constituting 3 to 40% of all early infant deaths. Those wh survive often remain malnourished with the accompaying risks. One hundred million children toda suffer severe or moderate malnutrition. Indeed, a non-fatal illnesses contribute to undernutritio which in turn predisposes to more frequent an more severe infection. Measles, pertussis, an especially primary tuberculosis have major nutr tional impact. In Guatemala, Gambia, or Bangl desh, where children suffer diarrhoea 10 to 15% the time, associated weight deficits reach 1 kg more per year. This disease alone reduces grow by one-half.

Adequate nutritional status, on the other han is an excellent predictor of survival. In Naran wal and Matlab, studies have shown that we nourished children in poor areas have mortali rates only marginally above our own, while t malnourished die at rates 10 and even 20 tim higher. Nutrition is an integral factor in surviv

Bio-Energy

Dr. T.N. Khoshoo

(Secretary, Dept. of Environment, Govt. of India)

iomass may not be the panacea ll our energy problems but it no doubt, help to reduce sub- ially our dependence on fossil . Being socially and environ- ally relevant, biomass enables keep our air, water and land and manage our life support m in a sustained manner. Two s are needed; first, in view of country being predominantly ultural, a perceptible tilt in ır of our plants and plant ce in our planning process by tion of the Photosynthetic el of Development, and second- dia has to be made increasinugl er. Among other things, such del envisages revegetating the tivated half of India to make ountry fresh and vendant. This have distinct environmental, and economic benefits.

lthough biomass may not al- be profitable on techno- nic consideration, this energy st relevant, both socially and onmentally, due to many gible benefits. One way to e the cost of biomass fuels is im at total utilisation of ss.

fore embarking on the "fuel crop and forest residue pro- ne", it is necessary that l investigations are carried the possible consequences omass removal from agri- al fields and forests in respect possible depauperation of nment. The amount of ss to be left in the fields and ests for enrichment of soil by natural processes needs to be esiimated, location and specieswise:

* An R & D programme on identification and development of silvicultural, agronomic and management practices for maximising biomass production under cullivated conditions is urgently called for;

* First-tier performance trials in specific locations witL specific plant species, having multiple uses, need to be undertaken as a prelude to massive afforestation/plantations for fuelwood on non-agricultural land;

* Methods need to be evolved to compensate for the faster depletion of nutriens from soil due to short rotation and high density plantations;

* Research on the utilisation of agrocultural residues as also aquatic biomass and municipal wastes for biogas generation requires to be undertaken;

* Research on bioconversion of ligno-cellulose needs to be taken up;

* Micro-organisms involved in bioconversion as also energy plants need to be genetically upgraded fo- high productivity and photosynthetic efficiency;

* Thermochemical processes/ technologies need improvement for higher yield of products;

* The energy and non-energy use of biomass needs integration and by-product utilisation requires improvement so as to enable utilisation of complete biomass.

* Wood burning stoves need improvement for attaining higher heat efficiency;

* A trained cadre of scientific and technical personnel in the aıea of production and utilisation of biomass needs to be created in order to enhance capabilities in this area; and

* Demonstration and awareness programmes need to be organised;

* Production of energy from biomass being a multi-disciplinary area, there is an urgent need for cooperation between concerned R & D agencies and Department of environment, science and technology, energy forestry, agriculture and community development. There is also needed a circumscription of the role of biomass energy for continued growth so as to achieve better balace among rural, urban, agricultural, forestry and industrial needs. It may, however, be emphasized that biomass can provide most of the products now obtained from oil, and in time to come, cellulosic materials will be increasingly utilised as feedstock for this purpose.

Let us hope that R & D on biomass ushers in a new society in our country which will rely more on renewable energy sources, such as biomas and solar technology, with smaller and more wide-spread industrial establishments that utilise biomass based fuel/energy systems, This will help us to manage our life support system better so that existence of humankind as also associated ventures such a agriculture, forestry and the relevant industry are not threatened. To achieve this, India will have to be made greener in years to come.

WANTED Civil Engineer/Architect

Centre of Science for Villages (CSV) needs a dedicated youth in its team who is competent in house constructions and willing to work in rural situations.

CSV intends to start a mission on rural housing with mud which is a cheap and basic raw material available for contruction in the villages. In 90% of the rural houses of Wardha district, the walls are traditionally made of mud using only white soil which is becoming rarer day by day. The black cotton soil so abundantly available is not fit in its present form, for construction owing to its numerous inherent problems. Similarly, wood which is an essential part of the understructure of country-tiled or mangalore-tiled roofs is also becoming scarce nowadays.

Hence, it is hightime to bring about drastic changes in our concept of constuction of walls and roofs and concentrate on other alternatives in making best use of local soil for construction of walls and minimum use of wood for roofing. The challenge lies in adding a new technological element in the structure to make it stronger and durable and simultaneously bring the cost of construction within closer reach of the rural poor. The beldars (a community of rural artisans who build mud walls) and village potters who are the prime artisans in rural housing also need to be given technological backup to suit the new innovations.

It is, therefore, expected that the person sought for this mission works with a team spirit; is prepared to understand the village life-especially the perception of villagers for their housses: aquaints himself with the experience of beldars; keeps in contact with new innovations brought out in the national laboratories; conducts experiment at field stations and arranges construction of a few demonstration houses in some villages around Wardha.

Interested persons should write immediately to The Director, Centre of Science for Villages, Wardha-442001 (Any student willing to choose this aspect as a Ph. D. subject is also welcome).

"Virtuosity
in any sphere—whether in the Arts or
the Sciences —depends upon the creative
freedom allowed to the individual. For
freedom allows latent talent to express,
itself—to explore new dimensions of
thought and action, unfettered by the
conventionality— to give
shape to innovations that change
the quality of life."

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India's Renewable Energy Scene

Dr. Maheshwar Dayal

A major effort should also be made for the wide-spread utilisation of non-conventional energy sources, based primarily on renewble energies which can help to grow more new biomass, reduce pressure on existing biomass and on conventional fossil fuels. Such sources are highly suited to complement and even replace the conventional energy sources, particularly in rural areas, besides increasing the efficiency of the use of traditional forms of energy.

In rural areas cooking energy accounts for the major requirement of energy. A rural energy survey of 50 villages covering 17 districts has been undertaken in Gujarat. The population of the villages varied from 160 to 5,000; of the villages selected, 5 were unelectrified. The study has once again confirmed that in the rural areas the household sector and, in particular, cookings accounts for the largest share (78.95%) of consumption of energy. 76.84% of the household energy is derived from wood and crop residues. On an average 3-5 hours per family are spent in gathering the fuel. The use of fuel in cooking is given. Lighting is the next activity in the household sector which accounts for a large consumption of energy. Kerosene and electricity constitute the main lighting fuel.

The use of more efficient "chullahs", biogas or solar cookers can reduce deforestation and health hazards, while allowing more spare time to women and children for productive activities, education or vocational training. Solar photovoltaic pumps and windmills can be used for lifting water for micro-irrigation and drinking water supply. Photovoltaic systems are also eminently suitable for street lights and domestic lighting. Solar thermal systems can be utilised for water desalination, timber seasoning, drying and preservation of agricultural produce. Mini hydel systems, wind generators, community biogas plants and biomass gasifiers can produce electricity for small-scale industry and traditional crafts Carefully developed combinations of renewable energy forms and storage systems namely integrated energy system,s can overcome the difficulties with individual renewable energy sources due to their site-specific nature, and interruption of supply to erratic local resource conditions.

An estimation has been made for a typical village of about 100 households which indicates that, to meet essential needs, the total annual energy reqnirement may be of the order of 0.15 million units (Kwh) comprising 0.12 Million units eletrical equivalent for thermal energy and 0 03 Million units eletrical energy. The thermal energy requirements have been taken for such applications as cooking and hot water for health subcentre; and eletrical requirements for irrigating two crops; drinking water supply; street and domestic lighting; refrigeration, lighting and fans for health subcentre; television, radio, lighting and fans for community centre; and for flour-mill or other cottage industry.

During the Sixth Plan, several decentralised integrated energy projects have been taken up in different parts of the country. The first such project has been set up at Masudpur near Delhi where community biogas plants provide cooking gas to village households; a photovoltaic system powers a television, radio set and tubelights; a windmill, in combination with a biogas engine alternator will supply drinking water to the village. The sale of eurihed manure providecs additional revenue. Another project is nearing completion in Salojipally, an unelectrified village in Medak district of Andhra Pradesh. The project comprises solar thermal power generating systems, solar photovoltaic systems, and a community biogas plant and engine. Energy is being provided for drinking water supply, street and domestic lighting, television and radio, and will also be provided for irrigation. In this project, integration of solar thermal and photovoltaic systems has been attempted on a large scale. Some of the other integrated energy projects already completed are in Gohri and Pathertal villages of Allahabad, Mazhwara village in Sultanpur, and Daudnagar village in Raibareilly, all in Utter Pradesh. Under a programme drawn up with BHEL, five integrated energy projeets have arleady been initiated in village Pipaliya Phandekhan (Bhopal), Kilakurchi (Trichy), Khaname (Chandnagar) and Copanapalli (Rangareddy) and Mazrabidi (Naini Tal). Several more are being planned.

The National Project on Biogas Development has been significantly expanded during the current year. The target for family type biogas plants for the current year has been fixed at 1,50,000 units as compared to last year's target of 75,000 units. A programme for

(Contd, on page 28)

Ecological Agriculture

(From the Bulletin of International Federation of Organic Agriculture Movement)

The principle aims of agriculture is to work as much as possible within a closed system and draw upon total resources, to maintain a long term fertility of soils, to avoid all forms of pollution that may result from agricultural techniques, to produce foodstuffs of high nutritional quality in sufficient quantity; to reduce the use of fossil energy in agricultural practice to the minimum, to give all livestock conditions of life that conform to their psychological needs and to ethical practices; to allow agricultural producers a decent return and satisfaction from their work, to maintain a positive relation to the natural environment at all levels.

In order to attain, or at least approach these objectives, the organic agricultual movement has adopted certain techniques whose aims are :

(1) Avoidance of those products (chemical fertilizers, pesticides and other chemicals of various kinds) and those methods (forcing of plant and animal growth, industrial methods of livestock management, etc.) which are in opposition to the principle aims, 2) Respect for natural ecological balances, 3) To do everything possible to ensure that the living organisms with which an agriculturist works (micro-organisms, plants and animals) become his alliens rather than his enemies or slaves. Where compromise is inevitable due to the ecological or the economic conditions in which we live, then the limits must be clearly defined. This document seeks to clarify which agricultural techniques are approved in organic agriculture, which are forbidden and which may in certain cases be tolerated.

The manurial programme must aim at maintainiug or increasing the potential fertility of the soil and its biological activity. In particular, sufficient quantities of organic material must be returned to the soil to increase or at least to maintain its humus content on a long lerm basis. Organic materials produced on the farm must form the basis of the manurial programme. Mineral additives may be applied in relation to the results of soil analysis, in conjunction with observations made on the farm (flora, crop yields, plant resistance to parasites, health of livestock) and to general mineral balance sheet of the holding that takes into account the mineral elements contained in any purchased organic manures or fertilizers. Application of nitrogen must be in an organic form. All synthetic nitrogenous fertilizers are forbidden.

In organic agriculture the aim is to grow crops under conditions where pestisides will be of no or little economic importance. Where organic husbandry is well carried out (varieties well adapted to the environment, a balanced manurial programme, fertile soils of high biological activity, correct rotations, companion planting, green manures, etc.), this result can be obtained in the majority of cases. The natural enemies of parasites should be protected and encouraged through provisions of conditions favourable to them (hedges, nesting sites, etc.). All synthetic pesticides are forbidden. In case of need recourse may be made to the products, listed natural methods and vegetable products.

राष्ट्रीय प्रयोगशालाओं को गरीब की झोंपड़ी से जोड़ने वाली हिन्दी की द्वैमासिक पत्रिका

ग्रामोपयोगी विज्ञान

हमारी राष्ट्ररूपी श्रंखला की सबसे कमजोर कड़ी है हमारे गांव। जंजीर की मजबूती उसकी सबसे कमजोर कड़ी में होती है। आइए, इस कड़ी को दृढ़ बनाने में हमारा सहयोग करें—'ग्रामोपयोगी विज्ञान' पढ़कर।

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Violating Nature Causes Violence

The Punjab crisis, the communal riots in Bhiwandi earlier this year, the strained Indo-Pak and Indo-Bangladesh relations, the overthrow of King Zahir in Afghanistan, the Islamic revoultion in fact, most Third World disturbances-riots, revolts, rebellions, guerilla movements, and wars between poor countries-can at least in part be attributed to environmental degradation, according to a report prepared by the UN affiliated International Institute for Environment and Development.

The thesis is this : Environmental degradation and competition for diminishing share of renewable natural resources are an important cause of violent human conflcits within and between States as the environment deteriorates, and this the report says, is happening "frighteningly fast in many regions of the Third World".

Being specific, one of the authors of this study Jon Tinker, said at a briefing yesterday that inequitable landholdings, rising populations, soil erosion, deforestation, and a steady deterioration in the natural resource base encourages political repression which sparks revoultion and violent attempts at change within poor countries.

Alternatively, growing populations forced to over cultivate, over graze, indiscriminatly fell trees, and otherwise over-use the land soon become "environmental refugees" seeking better-off habitats across international borders. This mass migration triggers inter-State strife and turmoil in the host countries. (As in the Bangladeshi exodus into Assam).

Tne "ecocide" in Third World rural areas also leads, Mr Tinker said, to massive movement of impoverished peoples to the urban centres which are transformed into power kegs of social resentments and economic discontent awaiting the lighted match (the Bhiwandi riots). By the year 2000' he estimated that there will be 50 "megacities" in the world, with populations of over a million, with all but 12 of them in the poor nations of the South.

The report goes on to account for various international incidents and trouble spots, like Indo-Pak wars and unsettled conditions in Punjab, about which it says this "Severe soil erosion in the Himalayan region has increased run-off after the monsoons, and decreased dry-weather flows, so that since Independence more and more reservoirs have had to be built. The same erosion silts up the dams. Simultaneously, much of the irrigated and non-irrigated land alike suffers from over-cultivation, water-logging and salinisation. This soil degradation increases demand for water from the Indus tributaries both in India and Pakistan and sharpens conflct between provinces in these two States."

The river waters dispute, this study says, has poisoned Indo-Pakies and is "inextricably mixed with religious, communal and political issues" and the demand for more water was used to justify the call for a separate Sikh State in Punjab.

Generally, the researchers think that the Indian subcontinent as a whole is "on the edge of total ecological collapse, and there can be nothing other than confict unless fundamental issues are addressed."

— Bharat Karnad

Eating The World

The world is living beyond its means. Unlike Great Depression of the Thirties, which stemmed from a boom which went out of control, today's recession is caused by the depletion of natural resources, according to a new report 'State of the World 1984' produced by the Worldwatch Institute in the U.S.

Oil prices rose partly due to overuse of dwindling reserves. The rise has slowed growth in grain production, weakened the car industry and depressed the demand for steel, rubber and glass. Many countries have not yet managed to reduce their oil consumption.

Intensified farming has doubled world food supplies over the past 20 years, but this has produced soil erosion 'of epidemic proportion,' Semi-arid northern China is losing so much soil that scientists in Hawai observatory can tell when spring ploughing starts by measuring the dust in the atmosphere.

Renewable resorce bases, such as forests and fisheries, are being whittled away. Worldwatch warns that 'in economic terms, the world is beginning to consume its capital along with the interest.'

(NEW INTERNATIONALIST)

Uses of Neem—The Wonder Tree

Neem (Azadirachta indica juss) is an ancient indigenous tree of India known mostly for medicinal properties of its various parts. Oil from its seed for soap-making and use in the manufacture of oil cake has been encouraged. However there are tremendous other uses of Neem as brought out by a study report entitled 'Utilization of Neem and its By products' by C.M. Kelkar and published by Directorate of non-edible Oil & Soap industry, Khadi & Village Industries Commission, Bombay 56, from which the following is an abstract)

Oil & Soap

The estimate of Neem Seed in India is 4.14,633 tonnes year, while the actual collection is 20 per cent, giving 25,000 tonnes of Oil and 75,000 tonnes of Cake per year. The Collection of seed is increasing year after year because of compulsory use of Minor Oils e.g. neem oil in the soap manufacture & excise concessions given for its inclusion, to the soap manufactures.

Bitters

The bitter fraction of neem oil is most effective in inhibition effect followed by sulphur containing adorecent compound of Neem oil. The crude total bitters and adorecent sulphur are about 50 per cent in the neem extractive obtained out of neem oil. A pilot plant is in operation at Jamnalal Bajaj Central Research Institute for Village Industries of the Khadi & Village Industries Commission, Maganwadi, Wardha (Maharashtra) for getting neem extractive from neem oil. The process can be further developed even to separate bitters which may serve as nitrification inhibitors from adorecent Sulphur compounds.

Fertilizers :

The work carried out by the National Chemical Laboratory, Poona, had clearly showed that extracts of Neem oil and neem cake are found to inhibit the growth of bacteria, namely, Nitrosomonas and Nitrobactor. Till the above process of separation is developed on a large scale, use of Neem Cake powder 20 per cent by weight of that of Urea when rubbed thoroughly prior to application has very good potentiality to increase the efficiency of applied Nitrogen. This use of neem cake blended-urea can save effectively 25 to 50 per cent Nitrogen use without affecting production of paddy and sugarcane. This not only makes saving of the major input fertilizer which takes 65 per cent of the cost of production but also increases the efficiency. The cost of Neem Cake is only Rs. 310 to 350 per ton. Increasing the efficiency of urea nitrogen in paddy is very essential to get good cost (of fertilizer) benefit (of yield) ratio Paddy crop occupying 22.5 per cent of the total crop area, utilizes 32 per cent fertilizer nitrogen. Increasing the efficiency of Urea fertilizer with small quantity of neem cake will definitely prove a boon to the poorest farmer who has to purchase the costliest fertilizers.

Preservatives

Neem leaves, Oil, and kernel powder give effective protection against stored grain pests like Moth (Ephestiaclautella), Rice weevil (Calendra Oryzae), Red flour beetle (Tribolium Castanevum), Angoumois grain moth (Sitotroga cerrealella Oliver), Lesser grain borer (Rhizopertha dominica), Callosobruchus adults 1 to 2 per cent. Neem Kernel powder or 1 to 2 percent of neem oil by weight that of grain or seed gives effective protection. The neem oil gets adhered to grain and forms a uniform coating around it. Grain or seeds like jowar (sorghum), wheat, maize, bajra, baddy, peas. Bengal gram, matki, mung and chavli can be effectively protected against stored grain pests for a period of 180 to 330 days. The germination of the treated seed is not affected. Organoleptic tests carried out after washing and cooking seeds showed no taste or smell of neem. Neem acts as gustatory repellent and has the most desired qualities being non-hazardous to man and domestic animals. (1) Use 800 grams of neem oil with 100 kg. grain or seed against stored grain pests. 2) Mix the neem oil thoroughly with grain or seed before storage. 3) The grain or seed will be protected effectively for 180 to 300 days. 4) The grain should be washed thoroughly before cooking. 5) The germination of treated seed is not affected 6) The seed if not used for sowing can be made edible by washing thoroughly before cooking, 7) Neem oil treatment gives 5 times benefit in case of grain and 12 times in seed 8) Therefore treat seed with neem oil instead of poisonous insecticides.

Insecticides

Neem leaves, Kernel, Oil seed

cake, fresh fruit and Neem products give effective control against Larve of Lucern weevil. Locust (Schistoceraca gregaria Forsk), Ephestia Cautella, Lipahis erysimi, larvae of cornearworm (Hellothis zea) fall-army-worm (Spodeptera frugiperda), Shield bug (Antestiopsis orbitalis). Mexican bean beetle (Epilanchna varivestis mulsant), diamond moth (plutella masulipennis &) beet leaf. But (Piesmaquadratum fieb) Euproctis lunata wik, Sunhemp hairy caterpillar (Amsacta moorei But), Aphid on bringle, Caterpillar (Spodoptera litura F.) Termite (Microtermes sp), Aphis gossypil (Urentius echinus o, Saissetia nigra N, Cabbage aphis (Breviceryne brassices L), cabbage butterfly (Pieris brassicae) adults of Aulacophora foveicollis, chrotogonus trachyptcrus (Blanch), Plutella Xylolstella and Cockroach.

The properties of neem are attributed to its gustator repellent action. Meliantriol, an isolated extract of neem, has 100 per cent antifeeding activity on locust. Azadirachtin inhibits locust feeding and has high activity as feeding repellent. Azadirachtin as systemic action, growth retardant growth disruptive properties, delays in egg production and also less egg production. Azadirachtin is structurally similar to the Ecdyson of insects. The growth disturbances caused by it are attributed to the interferences of the normal hormonal conditions of a particular insect. Azadirachtin's side effects on higher organisms and on human beings due to Ecdyson and its analogs are not to be feared according to the present knowledge of investigation.

The superiority of crude products of neem over refined product indicated that the component responsible for the repellent property was to a certain extent being removed during the process of refining. There is the feasibility of the economic utilization of the various need products as repellents against insects having chewing and hitting mouth parts. It may not be possible to replace the synthetic insecticides entirely Neem bitters but considering the non-toxicity, biodegrading ability and lower cost of the Neem bitters, it could be highly desirable to replace as much synthetic insecticides by neem bitters as possible.

Deoiled neem cake can be fed 400 grams, along with baggase, urea, cotton seed hull, mineral mixture and vit. AD, to the animals as maintenance ration.

Fodder

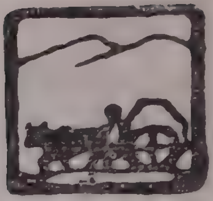
The neem leaves are quite palatable and can meet maintenance requirement of the bullock. There is possibility to use deoiled neem cake as a part of the famine feed along with baggase, urea, molasses, cotton seed hull, mineral mixture, salt and Vit. AD. Neem cake may not be classified as a true concentrate due to its high fibre contents. It cannot replaec 100 per cent groundnut cake in the diet of the growing cattle, because of bitter principle present in it makes it unpalatable. The Nimbin and its derivaties present have no adverse effect on microbial protein synthesis. Alkali treatment of neem seed cake and washing and drying yielded a palatable product. Alcohol extraction of neem seed cake also yielded palatable product.

Deoiled neem cake can be fed 400 grams, along with baggase, molasses, urea, cotton seed hull, mineral mixture & vit. AD, to the animals as maintenance ration.

Poultry Feed

The processed neem meal can be profitably used in poultry diet of both for chicks, growers and poultry layers. The feeding of neem cake to rats for 9 months did not produce any carcinogenic activity. Neem leaves extracts showed antiviral effect on Fowl pox virus. An aqueous extract of neem leaves was found to be non-toxic and antiviral against New Castle disease virus. Neem oil effectively controls metritis, endometritis, puerperal metrities and pyometra cases. The use of neem oil as antifertility drug is worth considering. The neem by-products have industrial potentiality like gums, plastic, paper, lipids, auxins, tannins, alkaloides, and petrolium crude and in the manufacture of furfural etc.

From The Plants



Petro Plants of India

Work is being done under a project entitled, 'Introduction, screening and cultivation of potential petro crops and their conversion into petrolium hydrocarbons'. The coordinating institutions in the project are the National Botanical Research Institute, Lucknow, and the Indian Institute of Petroleum, Dehra Dun. Under the project, 386 plants belonging to the families: Apocynaceae, Asclepiadaceae, Cannabinaceae, Convolvulaceae, Ulmaceae and Urticaceae have been examined and 16 most potential species identified. Studies on the conversion of the plant extracts/latex of the promising plant species are going on at the Indian Institute of Petroleum. (CSIR News—Oct 84)

Thar Desert Tree- 'Khejada' :

The Thar is the seventh largest desert of the world—nearly 600,000 sq. km. Geological and historical evidences show that it is of recent origion. Only some hundreds of years ago there was considerable forest there which was destroyed by continuous over-exploitation. The processes of desertification continue.

Dwellers of the Indian desert mostly use the wood of 'Khejada' (Prosopis folijlura) for fuel. This is an extremely hardy tree, growing fast in all types of desert, resisting well-water and soil pollutions as well as heavy cutting. In the towns and villages where it grows, it meets about 95 per cent of fuelwood requirements. Its branches are used for construction purposes, its thorny stems for fencing and, being a legume its leaves provide fodder.

This tree propagates fast, its seed widely dispersed in the droppings of animals, large thickets of it develop in a few years where it is introduced. A 40 to 60 per cent increase in rain has been observed in the desert areas extensively covered by this tree.

It has dismayed many, therefore, to see officials treat this useful tree as a weed in their efforts to plant Acacia and other species which have poorer survival and growth rates. Opponents of Khejada say that it grows and propagates so fast that other trees cannot compete with it. But the Juliflora was introduced only where other trees do not thrive. Secondly, it is possible to trim and train the trees to keep them within desirable limits. Properly pruned, juliflora grows into a shady tree, providing shelter to livestock in the parching heat of the summer.

Nigerian Chewing Sticks Save Teeth

One more folk remedy has been found to have a scientific basis. According to the Nutrition Research Newsletter (June, 1984), researchers from the School of Dentistry of the University of California at Los Angeles (UCLA) confirm that "chewing sticks," long used in Nigeria to control plaque and reduce the incidence of dental caries, do, in fact, contain properties that serve to accomplish that purpose.

The sticks are made up of portions of several indigenous Nigerian plants. When the scientists studied extracts from the chewing sticks, they discovered that it contains a compound, probably of the family of polyphenolic tannins, that slows the production of lactic acid and dextrams, both of which contribute to plaque and tooth decay and inhibits the adherence of substances to the tooth matrix. In other words keep chewing, Nigeria.

(LIFE—Oct.-Nov. 84, Vol. 17 No. 5)

Herbs Heal

It is a significant development are India and many Third World that now engaged in using the confidence and accumulated wisdom of traditional healers and age-old herbs in the all-out drive to achieve the goal of "health for all by the year 2000."

China has 400,000 hectares of medicinal herbs under cultivation under the care of the Central Laboratory of the Academy of Traditional Chinese Medicine in Beijing. There are more than 800 pharmaceutical factories with 80,000 workers engaged in producing some 2,000 varieties of medical herbs. An estimated 16,00,000 barefoot doctors who minister to some 800 million rural Chinese, make considerable use of traditional herbs. And the amount of medicinal herbs purchased is put at 13 million tons.

India, on its part, has established four independent central research councils—one for Ayurveda and Siddha, Unani, Homoeopathy and Yoga and Naturopathy.

(Source:—The Hindustan Times 30 Nov. 84)

Eradicating Termites From Buildings

Most of the termite-damage to buildings in India is caused, by soil-dwelling (subterranean) termites. They live in nests in the soil where they find the necessary moisture. In their search for food, they enter buildings through wood in contact with soil or through cracks or hollows in masonry walls, joints in floors, tunnels excavated in weak mortar, hair cracks in concrete and through galleries built on the surface of foundations, walls, piers, conduits, etc. Subterranean termites have infinite patience to find out weak spots in the structure through which they may enter the building. But those that have entered a building must maintain contact with the nest in the soil and this habit is utilised in eradicating termites from buildings.

A termite eradication scheme can be divided into three main operations which can be carried out simultaneously: (a) Structural repairs, (b) Nest treatment, and (c) Creation of poisoned soil barriers. Where termite attack is light, treatment of the galleries may lead to its eradication.

(a) *Structural repairs*—The first step in controlling termites that have already established themselves in buildings is to locate the points of entry. Structural repairs or alterations may then be necessary to ensure that all direct contact between the soil and wood in the building is broken.

(b) *Nest treatment*—The destruction of the nest from which the attack originates is required in order to eradicate termites completely from the building. Any termite mound within a radius of 50 m or so of the infested building should be opened by one of the chemicals mentioned below poured in to destroy the nest inside The quantity of the insecticide to be used would depend on the size of the mound of nest but for a mound volume of about 6.5 cu m the following quantities are recommended:

(i) 1 kg. of 10 per cent dust of DDT:

(ii) 5 litres of two to three per cent solution in water of sodium arsenite:

(iii) About 18 litre of 0.5 to 1 per cent suspension in water of gamma benzene hexachloride:

(iv) 2.5 litres of 0.004 per cent emulsion of Aldrin in water.

(c) Creation of poisoned soil barriers— These are useful in preventing termite attack in completed buildings which are difficult to treat by other methods. Such barriers can be created (i) around foundations and (ii) beneath the floor. Around foundations: poison-barriers should be created by digging a trench 30 cm wide and 45 cm deep along the foundation of the building and back filling with successive leyers of soil and toxic chemical. The soil used for back filling the trench should be mixed with any of the chemicals mentioned below at the rate of about 6 litres of the chemical per metre length of the trench per 30 cm depth: (i) 0.5-1 per cent emulsion in water of Aldrin: (ii) 0.8-2 per cent emulsion of gamma benzene hexachloride (iii) 1-5 per cent emulsion of Chlordane, (iv) 0.5-2 per cent emulsion of Dieldrin, (v) 8-15 per cent solution of DDT in mineral oil, (vi) 5 per cent solution of pentachlorophenol in mineral oil

Where termite infestation is severe, the higher recommended concentrations of the chemical should be used. Roof drains should be located so as to discharge beyond the poisoned soil-barrier.

Gallery treatment: In the case of light termite attack through accessible galleries the destruction of these galleries may suffice to protect the building. Such galleries may be observed around woodwork, cupboards, electric wiring etc. These galleries provide an opportunity for poisoning in termites in the nest. A small hole about 3 mm diameter is made in each gallery and white arsenic (arsenic trioxide) or Peris green (cupric acetoarsenite powder is blown into the gallery. The hole is then covered carefuy with wet clay. About one gram white arsenic is sufficient to treat three galleries White arsenic dust may also be blown into gallery within infested timber after carefully raising a splinter from the affected part. After treatment the splinter is carefully replaced in its former position and sealed with adhesive tape. If the infested timber is unduly disturbed, any termites which survive will attempt to pass into the undamaged portions of the gallery system. Dustpoisoning should therefore be carried out very carefully and only in galleries where termites are active and should be repeated at intervals of two to three weeks till complete eradication is affected.

The effect of the termite-eradicating chemicals usually lasts several years. It would help in controlling termite infestation if the neighbourhood of the building is kept clear of waste wood stumps and all plant debris.

Nitrogen-Cycle Sanitary Latrine

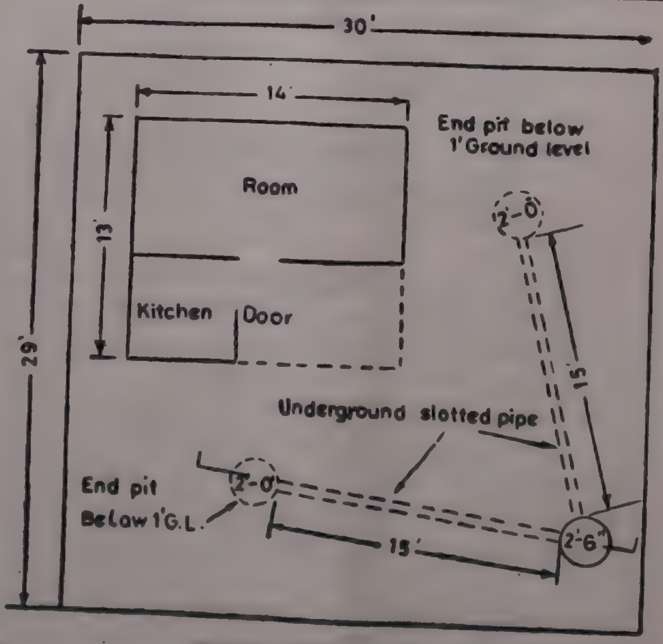
All types of existing unsewered sanitary latrines require de-sludging at some stage or the other. However, the Lutheran World Service (India) has successfully tried out a unique sanitary latrine, different from all others, at A/5, Santalpara Colony in kalyani 741235, dt. Nadia, West Bengal.

Construction—

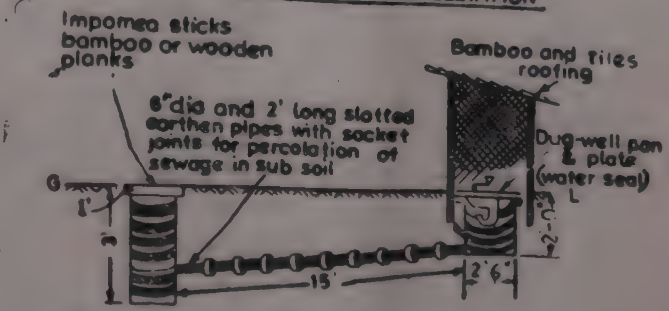
The design and layout of this sanitary latrine are illustrated by the sketch. It basically consists of a 2 ft deep dug well pit of 2½ ft. diameter, fitted on the top with a water-seal pan and plate. This pit is fitted with earthen rings and has a jammed brickbats soiling at the bottom. It is connected with two 3 ft deep subsidiary pits similarly fitted with earthen rings and soiling. The tops of the subsidiary pits are kept 1 ft below the ground level and are covered with 1 ft deep earth laid on closely fitted dried Ipomea Biloba sticks or timber scantlings. Each subsidiary pit is located 15 ft away from the main pit and is connected with it by a separate earthen pipe of 6 inch diameter, laid in slope of 1 in 20 with socket joints. The pipes are suitably slotted, through which the waterborne excreta pass into the soil to be converted into nitrates by bacteria for reabsorption by plant crop roots grown on the soil above.

The entire arrangement is airtight and the night soil undergoes conversion by anaerobic digestion-thus requiring no desludging at any stage, but producing profuse crops of fruits like papaya and banana or overground vegetables in the kitchen garden, on the soil above. To avoid infection, underground crops are NOT grown.

(Courtesy : Invention Intelligence)


30'
14'
13'
29'
Room
Kitchen
Door
End pit below 1' Ground level
2'-0"
15'
Underground slotted pipe
End pit Below 1' G.L.
2'-0"
15'
2'-6"

CROSS-SECTIONAL ELEVATION


Impomea sticks bamboo or wooden planks
6" dia and 2' long slotted earthen pipes with socket joints for percolation of sewage in sub soil
Bamboo and tiles roofing
Dug-well pan & plate (water seal)
G
L
1'
3'
2'-0"
15'
2'6"

- *Total plot area = 30' × 29' = 8:0 ft^2*
- *Area covered by hut and dugwell pit = 180 ft^2*
- *Area available for kitchen garden = 684 ft^2*

Location of sanitary latrine with shallow pits will depend on beneficiary's choice.

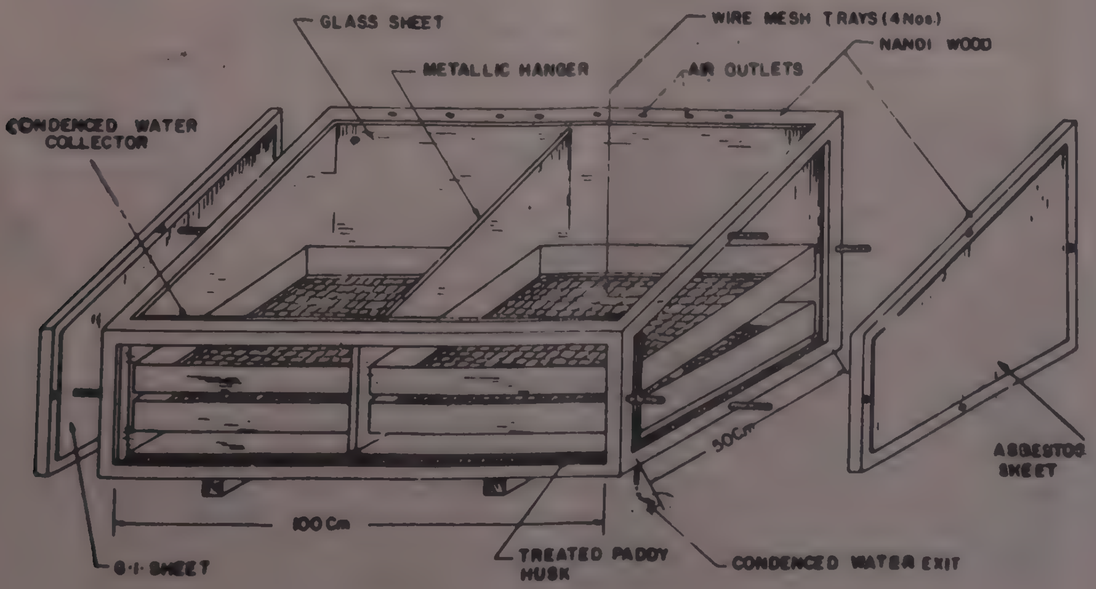
Solar Drier

Sun-drying of marine and farm products, when harvested in plenty during peak seasons, is the cheapest and the oldest method of food preservation. However, it has some drawbacks. It is time-consuming and generally needs considerable manual labour. It is also not possible to achieve complete drying, and the product, because of its high moisture content is prone to attack by bacteria and fungi. By passing air over a blackend flat-plate solar collector, it is possible to raise air temperature substantially. Based on this simple principle, the National Institute of Oceanography (NIO), Goa, has developed a cabinet-type solar drier.

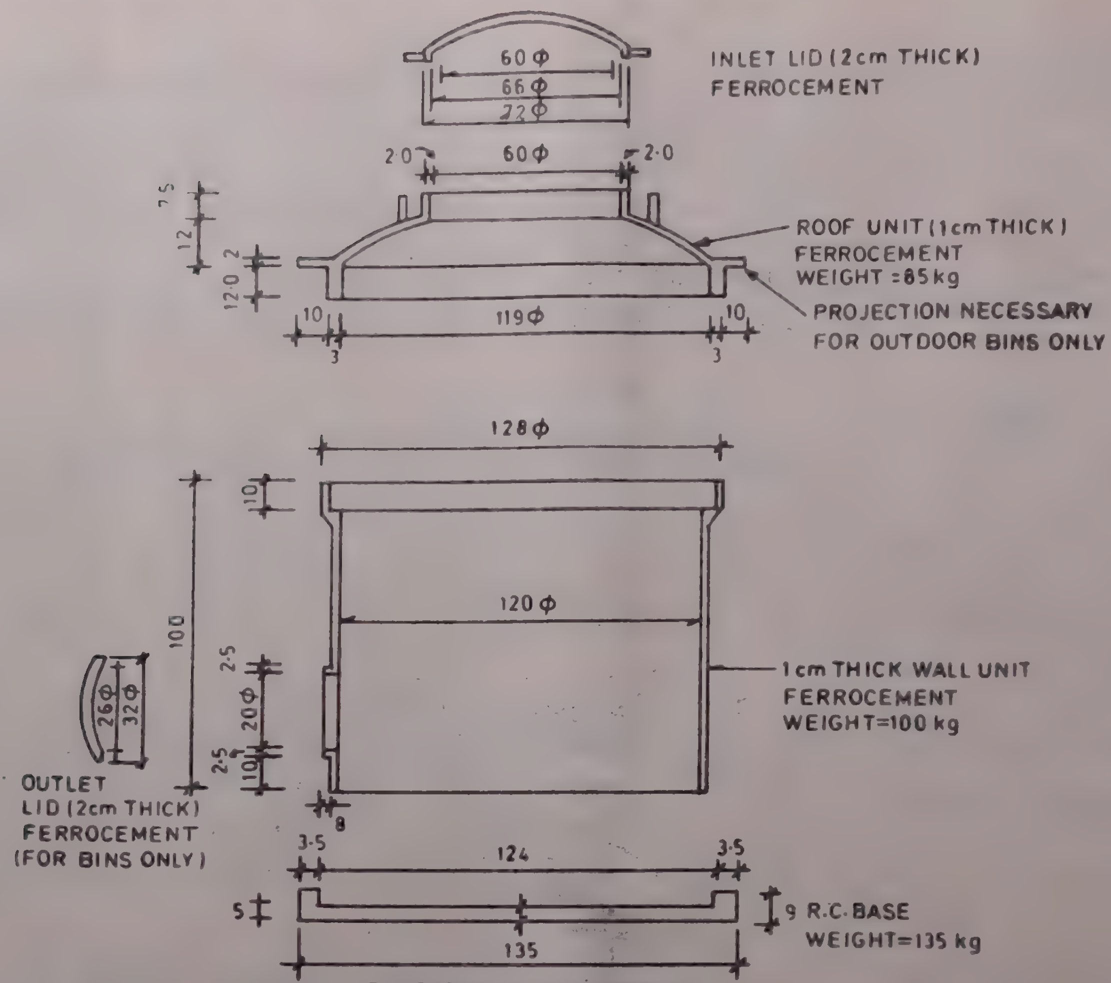
The solar drier consists of a rectangular box, of 100 × 50 × 35 cm dimensions, with an inclined upper lid. The drier (weight, about 50 kg ; floor space, 0.5 m^2) has two special features : (i) a nylon wick to collect and discharge condensed water, and (ii) a detachable metallic hanger fitted in the middle of the cabinet to increase the drier efficiency. The hanger is made of a galvanized-iron sheet and matallic shavings—waste from lathe shops. The hanger quickens the drying rate by about 10%.

Experiments have shown that about 50 large-size coconuts cut into halves can be dried in one lot in about 48 hr. The temperature of the *insitu* air in the laden state (coconuts), it was found in an experiment, to be about 70°C in May (1980), whereas in the unladen state it was 95°C. An open-air drying trial conducted simultaneously showed that it takes about 9 days to dry coconuts. Red chillies and grapes could be dried in about 72 hr. The metallic hanger was necessary only in the initial phase of drying.

To operate it the drier is kept in an open space with its longitudinal axis in the east-west direction, the tilted cover facing the south. The material to be dried is loosely spread over the four trays provided for this purpose. The side doors are now closed. Once every morning the drier is opened, the material remixed, and the position of the trays interchanged. The degree of dehydration required can be standardized for every product to be dried on the basis of previous experience or by a few initial trials. An important feature of this design is that its components can be easily dismantled, packed and reassembled. Its design being simple the drier can be fabricated by semi-skilled workers of rural areas after a short training. The estimated cast of a prototype unit is Rs. 500.



Ferrocement Storage Bins


INLET LID (2cm THICK)
FERROCEMENT
60Φ
66Φ
72Φ
2·0
60Φ
2·0
7·5
12
12·0
2
ROOF UNIT (1cm THICK)
FERROCEMENT
WEIGHT =85 kg
PROJECTION NECESSARY
FOR OUTDOOR BINS ONLY
10
119Φ
10
3
3
128Φ
10
100
120Φ
2·5
20Φ
2·5
10
1cm THICK WALL UNIT
FERROCEMENT
WEIGHT=100 kg
26Φ
32Φ
OUTLET
LID (2cm THICK)
FERROCEMENT
(FOR BINS ONLY)
8
3·5
124
3·5
5
9
R.C. BASE
WEIGHT=135 kg
135

SECTIONAL ELEVATIONS

ALL DIMENSIONS IN CM
NOT TO SCALE

The ferrocement bins developed at the Structural Engineering Research Centre (SERC), Roorkee, are cylindrical in shape and are assembled from prefabricated components, viz. base slab, wall unit, and dome-shaped roof unit. Bins of 1-2- or 3-tonne capacity may be assembled by erecting one, two or three wall units, one over the other, and filling up the joints. A manhole is provided in the roof unit for loading and an outlet is provided in the bottom wall unit for unloading the grain. Gaskets are provided for the inlet and outlet to make the bins air-tight, Locking arrangements are also provided. The external surface of bins is painted with a bituminous aluminium paint. The sizes of the various components of the bins are such that the units can be handled and erected by four persons. The wall units are cast by using the semi-mechanized process, also developed at SERC.

Ferrocement is a highly versatile form of reinforced mortar consisting of closely spaced layers of wiremesh reinforcement impregnated with a rich cement mortar. It is possible to cast ferrocement elements with a thickness of as small as 1 cm with 2 to 3 mm cover on either side. Ferrocement possesses high resistance to cracking, and unlike steel structures, has high corrosin resistance.

Ferrocement bins have the following advantages :

- Cheaper than steel, reinforced concrete, and aluminium bins.
- Lighter than coventional reinforced concrete bins.
- Require little or no maintenance.
- The condensation and moisture migration problems in food grains stored in ferrocement bins are much less than in food grains stored in steel bins.
- Rodent-proof, fire-proof and damp-proof, the ferrocement bins can be made air-tight easily by sealing the inlet and outlet openings, and hence the bins retain fumigants well.
- Any structural damage can be easily repaired.
- Can be easily fabricated at the rural level.

The fabrication technology is simple and can be easily acquired by the rural artisans.

For details, contact SERC, Roorkee (U.P.)

Animal Power

"Draught animals constitute a decentralized renewable source of energy … for which little information is available.

In India, over 80 million draught animals have been counted.

Their combined power is equivalent to 30,000 megawatts . draught animal energy should not be overlooked."

(Source: A/CONF.100/PC/17. Para 38.)

Women as Innovators

Technologies are basically developed for greater productivity. There is a wrong feeling that the male has been the main procurer and producers of foods and goods, and so has contributed most to the development of technologies and innovations. As we go in the details of the history of our ancients, we find that the basic thrusts in innovative areas were made by women. We can go on adding to this list ad infinitum to to show the innovative genius of women, as expressed in technologies past and present. While taking pets she developed the domestication of animals for economic use, expressing her artistic talents. She discovered the art of spinning the fibres into yarn and weaving the yarn into cloth. And as she picked seeds of edible fruits and vegetables and grasses, she discovered their sprouting and growth. Thus sowing and agriculture developed out of her kitchen garden. The basic innovations from the fertile mind of women as they looked after the family-especially the children and applied themselves in experimenting with their environs, brought great change in the human scene till cooperation was the key note human civilization. But as competition became the law of life the male dominance gained ground and women's innovativeness was thrown in the background. We note that competitive commercialism has pushed back this role of women and as cosumerism, competitive salesmanship and means of destruction to protect one's markets were on an ascendancy, the innovative capacity of women was on a downward curve. This trend is to be changed for saving the planet's life cycles and so as compassion, peace, cooperation, and mutuality is sought to be developed in the society, the innovation of technnologies for and by women will gain grounds. A deeper study in the peaceful nature of innovative instinct amongst women will be very revealing and reassuring.

Psychology of defeat deters innovation

Another point regarding innovations and discoveries of technological applications is that the old adage that "Necessity is the mother of invention" is not universally true. People in dire need do not necessarily find a solution to their problems. Such people are mostly having a depressed mental state and having been unsuccessful in their efforts for a long period of time through many generations, suffer from psychological defeatism and depression. They therefore lose the capacity to try out new options as their risk taking capacity is at a very low ebb. Since innovations by nature require an element of risk taking, it has been found that it is the people in a victorious mood and who have tasted successes are the ones who gain confidence to go in for new inventions. This is why India in its hey day made many new technological progresses but tarried behind when it became a defeated exploited nation. The countries which are riding on the crest of economic success are the ones which are most innovative. The two aspects seem to reinforce each other. It seems that in the male female differential contribution to technology as well this law seems to rule.

Equal inter-dependence of sexes

Any society is in a progressive mood when its efforts yield commensurate successful results and when the climate is such where both men and women contribute to innovations. This tempo of progress increases steadily when the mutual interdependence of the two sexes is balanced and there is equality of opportunity to both. There was a spurt of new technological contribution from both the sides when the sex discrimination was less but later on as elitism, urbanisation and stratification in social structure gathered a momentum, the sex gulf also widened and creativity of the females was greatly snubbed and ultimately almose snuffed.

It is a misconception that in pre-industrial era the man-woman relationship was more skwed. Actually the male domination in the society has increased with mechanization. The fact, as we see in rural India amongst the landless labourers and small marginal farmer families is that comparitively their womenfolk are less dominated by the males than in the higher income group families. This is because in the farmer both of them jointly work and contribute in the productive processes. They work together in the field as labourers and share in the out-of-house activities. It is in the middle or upper class, that women are more differentiated against. The dowry deaths are most in this class. The technological innovations in such an oppressive atmosphere are difficult to flower because (a) they suffer from psychological insecurity, (b) socially are unequal in status, and (c) have little recognition for their contribution in the productive processes. (Ivan Illich has called such unrecognised women's work as "Shadow Work"). These conditions have progressively sapped the women of their innovative expressions in technologies.

Five areas of technologies for women

The technological age is one of competition where each is trying to bring out new products in competition with others whereby the total productivity is increased but it does not bring societal justice. The gap between the rich and the poor and that between the power of men and women has been increasing because of the nature of this productive process. It is due to this that half of the people of the country are living below the level of subsistance and though the total GNP makes an increase, its impact is comparatively little on the lower strata and the level of life here remains much the same. This applies also to the man and woman gap and the state of latter is still very pathetic. As industrial era is progressing, the five areas where the women in the villages are hit most, are :

(i) Increasing drudgery in collecting fuel, fetching water, cleaning and manure making, storing and cooking food and other household activities.

(ii) Deprivation in the income generating sector, because with increasing under/unemployment the male counter-parts take away whatever avenues were earlier available to women and no new avenues are being explored and opened for the women.

(iii) Drinking water and sanitation problems also go on increasing with increase in concentration of populations. The village populations have increased tremendously during the centuries and the practices of sanitation and drinking water which were safe when environments were cleaner and people lived in open spaces have now become unhygenic and harmful.

(iv) Health and nutrition become problematic for women, where the poor of the land are finding it progressively difficult to make the two ends meet. Newer knowledge of nutrition, has to be translated in a form that can sustain the health of the teaming millions. The women being the custodians of the health of the family should also be equipped with all the tools of technological innovations which can keep children and adults in health.

(v) Then there are hazards of various kinds which are more harmful to the women. These are to be identified and removed and protection procedures adopted.

Five tests

In the field of innovations in technologies which can be of help to the women, we have to begin with strengthening the weakest link in the chain. This link is the women who are most deprived of the rural poor. This exercise will automatically open up new vistas of undertanding and provide a right direction to science and technolooy. The five sectors mentioned above namely—(i) drudgery removal, (ii) employment generation, (iii) water and sanitation, (iv) nutrition and health and (v) hazards and accident removal are the priority areas in which we have to use technological application.

In assessing a particular technology for women, we have to apply five tests. *Firstly*, that it falls under one of these sectors. *Secondly*, that it helps those sections of people more who need to be assisted most. *Thirdly*, that it is applicable on a large scale and not apply only to a certain close group. The multipliability quotient of the innovation should be high. *Fourthly*, it should help to restore ecological balance and be environmentally sound. *Fifthly*, and most importantly it should help in the growth of the innovative and scientific temper of the women users by involving them in the process of experimentation.

Some Examples

It would be helpful to see the above points in practical examples :

(1) Drudgery Removal

Improved smokeless cookstove; ball bearing fitted pulley for drawing water from the well; wheel barrow to take the weight off the heal. Biogas plants giving both fuel gas and manure, better grain storage techniques to avoid unnecessary waste and labour, increasing better methods of keeping the house in good repair, better implements for working on the farm etc.

(2) Employment and income generation

Better use of the kitchen gardening for more food and nutrition, utilizing the agro-waste in new industries and better manure making techniques, home industries, village industries for women.

(3) **Water & Sanitation**

Soakage pits for the well and household affluents, pot chlorination of the well, water candle filters fitted to mud pots for drinking water, other methods of water treatment to make it safe for drinking ; various kinds of cheap and effective simple lavatories to enable women from avoiding going to ease in the open etc.

(4) **Nutrition & Health**

Breast feeding and rearing of the infant, cure of usual diseases by simple methods, indigenous practices which have stood scientific tests being revived. Nutritional principles applied in cooking food etc.

(5) **Hazards and Accidents Protection**

Burns, snake and insect bites, toxins in food and other hazards which village life is prone to.

8. Women's share in Generating Technology

Here it will be seen that the area is vast and there is a crying need to generate technologies therein. The technologies of the right type can be developed not by the scientific labs alone but the combined intelligence of the consumer women and the innovative experts. These experts can be from our scientific disciplines or people with knowledge in the village itself. Actually the three together should interact. The consumer, the village artisan and the scientific expert. The women will have to be involved not only in the use of the new technology but also in its generation. Then only the right kind of product will be available.

The technique to be in an assimilable form for the people for whom it is meant has to be tried out in the field and moulded accordingly by passing the tests of not only technological and economic viability but also social viability. The three together can make a technology appropriate.

Devendra Kumar

Women *in* rural areas need t be informed of their rights : The recommedations by 15 experts of the conclusion of a two-week seminar on improving the situation of rural women that the situation of women in the rural environment, was dependent on the achievement of equality, stability development and peace.

In order to recognize, promote and reward women's contribution to both agricultural and non-agricultural production in rural areas, greater attention should be given at the national level to research and information collection on this subject. In addition, the experts agreed that more women should share in decision-making at all levels of planning in some cases this could mean granting political- and civil rights to woman similar to those granted to men.

Prejudice, considered a major stumbling block, could be overcome with the provision of accurate information on women's conditions, through increased levels of education and modifications in rigid attitudes on the role of women in society and in the family.

(U. N. Weekly, Oct '84')

Alternative Nobel Prize To Four Women

Four women from Asia and Africa share the 1984 Right Livelihood Award of 350,000 Swadesh Kronor. This is the first time that a major European Award has gone entirely to women from the Third World.

The prize was introduced four years ago by a Swadesh-German Alternate Member of the European Parliament, Jakob von Uexkull who sold his valuable postage stamps to fund it. It is presented in Stockholm on December 9th, the day before the Nobel Prize ceremony to 'honour and support those working on practical solutions to the real problems facing us today'. The winners of this year's Award are :

—Winefreda Geonzon (Philippines), Lawyer and founder of the Free Legal Aid Volunteers Association in Cebu City which explores new ways to support and rehabilitate prisoners and organise the poor under conditions of martial law.

—Professor Wangari Maathal (Kenya), biologist and women's leader who pioneered the 'Green Belt' reforestation movement.

—The Self-Employed Women's Association in Ahmedabad (India) founded by Mrs Ela Bhatt which pioneered the organising of homebased producees.

A special Honorary Award will be presented to Miss Iman Khalifeh of Lebanon was has inspired and organised the Beirut peace wovement.

points to ponder

CO_2 THREATENS NATURE'S BALANCE.

The effect of the rise in atmospheric carbon dioxide may already be showing up in the trees of western mountains, many scientists are predicting that a continued increase could profoundly transform the balance of nature.

Until recently, most research on and concern about rising levels of CO_2 have focussed on anticipated climatic changes expected to result from the "greenhouse effect." But now researchers from the Tree Ring Laboratory at the University of Arizona have found that growth rates in the slow-growing bristlecone and timber pines of the West have roughly doubled since 1950. In the absence of any climatic trends to explain the difference, the researchers believe that increased levels of CO_2, which promotes photosynthesis, are responsible for the change. And they expect as CO_2 levels continue to rise, the growth effects will continue to increase. This may be good news for agriculture, but scientists believe it could be a disaster for natural communities. Because not all species are equally responsive to CO_2, the higher growth of one species could cause the extinction of other species, which in turn would afiect that plant's competitors, consumers, and pollinators, with reverberations throughout the ecosystem.

MORE DOUBTS ABOUT A-PLANTS

A recent report commissioned by the atomic Industrial Forum, the nuclear industry's promotional arm, given one of the most negative assessments yet of the industry's condition. The report states, "Nuclear power cannot at this time be considered a viable option on which to base new electric generating capacity in the U.S." This gloomy judgment is most surprising because it was made by a 31-member panel of top nuclear industry executives from such firms as Duke Power Co., Westinghouse Electric Corp, and General Electric Co., as well as financial analysis from Citibank and Merrill Lynch Capital Markets. These executives made the rare admission that some nuclear plants "have not worked as well as their designers believed they would." And while the panel blames part of the problem on lack of certainty and stability in the licensing and regulation of nuclear power, it also says that "until construction lead times have been reduced and until there is greater public consensus in favour of nuclear power, the private sector cannot take on the open-ended financial risks that now attend the nuclear power option."—(Wall Street Journal, July 6.)

HOUSING PROJECTS BEYOND REACH OF URBAN POOR

Many Asia Pacific Government have paid unusually large attention to costly public housing projects that often do not meet the increasing demand for shelter by the poor city dwellers.

Those projects in general benefit only a limited number of people because they are priced beyond the reach of most low-income earners, according to a report by 10 human settlements convened on October 2--5 by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

"Instead of using the scarce financial and organizational resources in public housing schemes, if Governments concentrated on sites and services programmes and upgrading of slums and squatter settlements," the report said, "much more benefits could be achieved in addressing the critical shortage that are continving to increase."

(U.N. Weekly)

from the labs

In this column, we invite techniques evolved in the labs of India as can benefit the villages and help in creating a new order.

1. THE BHARTIYA COOL CABINET

In tropical countries such as India, it is difficult to keep perishable food preserved by any cheap method. Refrigerators, and the power they need, are too expensive for most of the rural population. The Bhartiya cool cabinet is suitable for both rural and urban situations, although it is more efficient in places where electricity is available.

Construction : There is a cabinet which is heat-insulated and has two chambers with separate doors. Heat insulation is provided by polyurethane foam or any cheap material such as rice husks, sawdust or wood-shavings. Polyurethane foam is, however, most suitable and lasts longer.

The roof of the cabinet has a conical shape. In the centre there is a hole in which a chimney (8-10 cm diameter) is fitted. At the base of the chimney a minifan is fixed to the top of the roof, pointing up into the chimney.

Each chamber has various shelves of wire mesh. The bases of the chambers have many holes which allow air to enter in from the outside. The bottom is surrounded by a skirt of cotton mesh which is immersed in a tray filled with water. The whole system stands on feet, allowing the water tray to be removed and refilled as necessary.

The system works on the simple principle of any cooler. When the fan is switched on a current of air moves upwards. Fresh air is therefore drawn in through the holes in the bottom of the cabinet. Before the air enters through the holes in the bottom, passes through the wet cotton mesh, losing some heat as the water evaporates, and therefore there is a drop in the air temperature. This cool air enters the two chambers and gradually cools the chamber contents.

The main advantage of this system is its cheapness and the fact that relatively little energy is used by the fan, if, however, electricity is not available, a cheaper (but less efficient) version of the cool cabinet can be made using a lamp instead of the fan. The lamp should be fitted to the base of the chimney, supported on a small shelf, so that its flame is inside the chimney. The lamp warms the air in the chimney, which then rises, drawing cooler air up from below, through the cabinet, to take its place. If the lamp-powered version is used then the chimney should be painted black inside, while the outside should be covered with reflective paint or aluminium, or even insulated with glass wool.

The two-chamber design allows things which are used frequently, such as drinking water, to be kept in one chamber, while the contents of the second chamber (things used less frequently such as milk, cheese, butter, vegetables fruit and so on) are undisturbed. This chamber division enhances the efficiency of the second chamber, because frequent opening of the door means less cooling.

The temperature drop is not as great as that of a refrigerator, yet this cool cabinet is feasible for common use. The only drawback may be in the monsoon season when the humidity reaches its peak.

(Arun Pratap Singh, Saurikh,
Farukhabad, U.P.)

2. SIMPLE METHOD OF REPAIRING BROKEN PLASTIC BUCKETS.

Plastic buckets have become very popular because of their light weight and low cost. However, once broken they can not be reapired satisfactorily. The author has tried out a simple method of repairing broken plastic buckets and similar items.

To begin with, using a hot needle make two parallel rows of small holes at 5 mm spacing on either side of the crack. Make the surface around the crack slightly rough using a coarse sand-paper or a hacksaw blade. Apply an apoxy adhesive like Araldite to the roughened surface so as to fill up all the holes. Now saturate a Terrycote thread with the adhesive and pass it through the holes with the help of the needle, forming a stitch should be suficient to keep the crack closed. Finally, apply another layer of the adhesive on both surfaces of the stitch. After 24 hours you can use the bucket like the original one : even hot water will not damage the joint

(S.P. Roy 8, Amadeep Society,
At & PO Anand 388001.
Gujarat.)

(Source : Invention Intelligence)

3. IMPROVED BULLOCK-CART

In an ordinary bullock-cart, the bullocks have to carry the entire weight of the cross bar over their necks and the strain thus caused reduces their efficiency. This problem may be partly solved by providing a wheeler attached to a cylindrical iron rod in the centre of the cross-bar. In case of a single bullock cart, two such wheelers may be fitted on either side of the straight wooden bar with the bullock walking in between.

The iron rod with the wheeler should have sufficient bearing capacity so as to sustain almost the entire burden of the cross bar, keeping the animal free to pull the load.

WINDOW TO THE WORLD

Sea water Desalination

A new patented process for desalinating sea water has been developed by the Swedish National Development Company. The process called the SU Membrane Distillation System is a low-temperature, low pressure design based on a combination of thermal and membrane effects. The system is highly flexible, being formed by modules producing 5 cu. m. each per 24 hours. It is consequently competitive within a wide range of applications, on land or offshore, as for example on ships, in hotels and tourist resorts, industries, offshore platforms and in agriculture.

For its operation, the system requires an input of water at two different temperatures, warm water for evaporation and low temperature water for condensing and cooling. The warm water—salty ground water, waste water from industries and power plants, solar heating and heat pumps should have a temperature ranging from 40°C (104°F) to 70°C (158°F). The cooling water—normal temperature sea water, water from cooling towers or heat pumps—should have a temperature of approximately 25°C (70°F).

The warm water is pumped into vartical channels where evaporation takes place. Part of the water is transferred as vapour through a hydrophonic membrane and condensed on the other side of the membrane on a thin plastic film. The plastic film, in turn, is cooled on its other side by sea water.

The desalination apparatus consists of layers of membrane condensing film, forming a complete module.

Main advantages of the SU Membrane Distillation System are :

Low energy costs—the system utilizes the natural temperature gradients of waste energy.

Low capital costs—the entire evaporation unit and connecting pipes are made of plastic.

Low maintenance costs—for the same reason. And no corrosion or edposits

Low staff cos's—due to the low—temperature, low—pressure and simple design, the system can be operated by a non-specialist staff.

Source : Sveska Utvecklings aktiebolaget

(Swedish National
Development Co.)
Box 34
S-184 00 Akersberga
Phone ; Int + 46764 60040
Telex : 15313 suab s
(Contact : Lars Carlsson)

Tempeh—A Health Food

Tempeh is olso a medicinal food and the Sri Lankans love it. It has a high protein content, close to that of meat and fish, and is essentially vegetarian as it is made out of soyabean. Besides the proteins, it is rich in vitamin B, and also has enzymes that assist digestion.

Temeph is also a medicinal food as it resists common illnesses. Its rich unsaturated fats make it ideal for those with circulatory troubles and diabetes. There is evidence that it acts as an antidote to certain stomach ailments also.

Mrs. K.G.S. Ariyaratna who is a food technician at the Soyabean Foods Research Centre in Sri Lanka describes the process to make tempeh as follows :

Whole or dehulled soyabeans are soaked in clean water overnight. The soaked water becomes acidified as a result of bacterial action and is a drawback in tempeh making. Hence this water should be drained after soaking and the beans washed well in clean water several times.

Ideal temperature for tempeh making is 31°C and humidity 80 per cent. The washed beans are boiled for about 30 minutes, drained cooled and moisture removed. Starter (the mould Rhizopus oligosporus) is added at the rate of one teaspoon per kilo mixed in two tablespoons of parched rice, wheat or cassava flour. This is then packed in 6″ × 8″ polythene bags with perforations at 1″ intervals and sealed. The sealed bags are tamped well and left on wooden racks for 32-48 hours for fermentation. During fermentation, tempeh heats up, forming moisture on the upper layers. It is ready for use when heat drops and moisture disappears. Its shell life is two days, can be refrigerated for a week and deep frozen indefinitely. Well made tempeh is firm to touch and smells of fresh earth.

Tempeh can be incorporated into food in many ways, Even on cooking under high temperature, the loss in nutrition is very low. The shell-life of tempeh can be increased on drying it in sun or in an oven.

(Tech Monitor—April 1914)

Singapore Stores Rain Water

The Republic of Singapore plans to use urban runoff as a primary source of water for a new water supply system that will provide the eastern half of Singapore with 36 million gallons (136,000 m^3) of water per day.

The system will capture 70 percent of the total runoff from controlled watershed areas, and a new treatment plant will ensure that the moderately turbid runoff is treated for potable use. The reservoirs will use air-bubble diffusers to maintain full mixed conditions and provide a 6 month to 1 year detention time to allow particles to settlment. The plant will then disinfect and chemically oxidize the raw water using ozone. The system can later be expanded to hold 72 mgd. (272,000 m^3/d).

Prohibition in Wardha

1. The legislation in 1975 of total prohibition for Wardha district contributed towards bringing about many positive results. The stoppage of drinking in public places publicly was itself socially beneficial. Petty crimes have come down. The number of street fights has decreased. The base for breeding habitual criminals has weakened. It has become safer for women to go out in the evenings. The inducement to the young man particularly students to imbibe the habit of drinking, is less.

2. The Bureau of Rural Development, Sewagram, conducted two successive surveys, one in 1979 and the other in 1983, to evaluate the working of prohibition in Wardha district. Twenty-six villages were intensively surveyed, more accurate figures of population have been obtained, the occasional type of drinkers were further classified and the different types of stills have also been identified. The survey results suggest that it is not advisable to cite the difficulties of enforcement as an excuse for postponing a policy of total prohibition initially. When the sufficient conditions cannot be made immediately operative, it does not mean that the necessary condition need not be ensured ; and that necessary condition is the legislation of total prohibition. The advantages would have been more marked if legislation were to have been made with seriousness and integrated to the rest of the fabric of national policies.

3. During the four year period between 1979 and 1983, according to the surveys, the degree of decrease in habitual drinking has been about 39 per cent with total population as the base or between 39 per cent and 42 per cent with adult male population as the base. However, only about 39 per cent of the male adult population could be said to practise complete abstinence from drinking alcohol even in 1983 ; it is a rise from about 26 per cent, though. In other words, the total number of people drinking either regularly or only occasionally including those who drank only once or twice a year has fallen from about 74% per cent to about 61 per cent of the adult male population. It is appreciated that the latter figure itself is high.

4. However, no one could be identified as having stopped drinking because of the effects of enforcement of prohibition. Illicit stills increased in numbers after the introduction of prohibition, and there was considerable illicit entry of liquor from the neighbouring districts. But the additional supply of liquor from both these sources is less than the quantity previously available legally before prohibition.

5. The general impression of the public was that more people drink after prohibition was introduced, than before. Yet the results of the two surveys canvassed among the very people who hold prohibition has been ineffective, definitely show that the incidence of drinking has decreased appreciably in the district.

Alcoholic rats

Rats can become problem drinkers when placed in a "social drinking" environment, according to research byGaylord Ellison, a psychology professor at the University of California, Los Angels, who placed his rats in a colony. It contained a central recreational area and adjacent "cocktail lounge" with six drinking spouts—three delivering alcohol and three providing water. Ellison found thnt 9 parent of the rats developed an extreme preference for alcohol, about the same percentage of humans who pare roblem drinkers in modern societies. The ' heavy drinkers" in the colony also showed some behavior similar to human alcoholics: they ate less, were much less active, spent more time in their burrows, drank most in the morning, and ranked low in dominance in social situations. These rats also suffered from significant liver and brain damage.

BOOK WATCHING

Why Big Dams ?

As India proceeds in harnessing water for irrigation and power through bigger dams, it should head to the studies that show the drawbacks as brought out by 'Ecologist' editor Goldsmith's recent book.

The Social and Environmental Effects of Large Dams by E. Goldsmith and N. Hildyard. Volume 1 : Overview 345 plus appendices ; published by Ecosystems Ltd. Worthyvale Manor Farm. Camelford, Cornwall PL 329 TT, UK. Price £ 15 for individuals, environmental groups and Third World institutions, £ 25 for other institutions. Two more volumes in preparation—Volume 2 ; Case Studies ; Volume 3 : Annotated Bibliography. Prtce per volume same as volume one, or £ 35/£ 60 per set. Airmail postage £ 5 per volume exira.

Goldsmith and Hildyard have collected a unique dossier of the effects of big water projects, covering virtually all the major schemes implemented in recent years. The picture they paint fully justifies the book's own description of : "Massive ecological destruction, of social upheaval disease and improverishment." as joint editors of the Ecologist, the authors have adopted an admittedly one-sided approach to data collection, but the selective nature of the evidence only adds to the power of this book's message.

Large dam projects are accused of failing to achieve any of their basic objectives—cheap clean power flood mitigation, increased food production through irrigation, etc—and of leaving "a legacy of unsurpassed cultural destruction.

Starting with resettlement, the book blames insensitivity of designers and politicians for a high failure rate in delivering the promise of a better life to those uprooted by reservoir schemes.

Statistics on past and planned displacement of people to make room for reservoirs include : 78,000 for Ghana's Volta Lake ; 42,000 from lake Kainji in Nigeria ; 450,000 for the Pa Mong project in Vietnam; the estimated 1,400,000 to be displaced by China's Three Gorges Scheme ; and about 1.5 million affected by proposals for 40 new dams in the philippines. There are many more, but Goldsmith and Hildyard also claim that the low compensation estimates needed to make big dam projects economically viable, inevitably lead to inakequate housing, inferior land, and total neglect of cultural needs.

The plight of the resettled communities is summed up thus : "Malnutrition and diseases are rife, jobs almost impossible to find. It is a world far removed from the 'paradise' offered to them by the authorities. Unfortunately it is a world in which most of them will spend the rest of their lives."

Perennial irrigation, they claim, has greatly favoured both the incidence and lethality of malaria, by increassing the period during which mosquitos have the right breeding habitat. As a result, malaria has been introduced to areas which were previously clear of the disease, while the lethal form of the disease is becoming much more widespread.

With schistosomiasis too, the statistics are frightening. Growth in the number of people affected from 114 million in 1947 to 200 million today is blamed largely on new water projects bringing fresh habitats for the snail carriers. Increase in infection rates associated with new projects include a claimed jump from 21% to 75% following the building of the aswan low dam, and to 100% in some areas on completion of the high dam.

Perhaps this book's most telling chapter deals with salinisation of agricultural land. Quoting the Food and Agriculture Organisation's estimate that at least 50% of the world's irrigated land now suffers from salinisation.

One recent study shares that much irrigated land is now being taken out of production due to waterlogging and salinisation as new irrigation schemes are brought into :

1. In Pakistan, 10M.ha of the 15M.ha under irrigation are estimated to be salinised, waterlogged or both, and the figure is growing at more than 100 ha a day.

2. In India, the amount of land devastated by water and salt

has been variously estimated at between 6 and 10M ha—almost a quarter of the 43M. ha under irrigation.

3. More than half Iraq's 3.6M. under irrigation are saline or waterlogged.

4. Even in the USA, 25.35% of the irrigated land suffers from salinity.

(Source : World Water—: Nov. 84.)

Books Received

'Technologies for Human Welfare and Community services' by C.S.I.R. Rafi Marg, New Delhi-110001 is in the series of 'Technology for Rural Development' and can be had by writing to CSIR.

The Council of Scientific and Industrial Research (CSIR), the country's premier scientific and industrial research organization, has done considerable work on the generation, development and demonstration of new technologies with potential for ameliorating the conditions of people living in the countryside. The Council has in the past presented them through some of its publications. While the one released as recently as October 1983 relates to "Production-oriented and Employment-generating Technologies", the present publication deals with "Technologies for Human Welfare and Community Services". These two publications are indeed a kind of 'technology shelf' for one looking for tools of development to pick and choose those appropriate to their needs.

The technologies under "Human Welfare and Community Services" do not claim to provide direct monetary benefits, but their overall gains to a family are discernible. These could be, for instance, in the form of reduction of drudgery, elimination of health hazards, and generally contributory to improved living conditions.

Foreign Journals Received

1. *Tranet*—(Transnational Network for Appropriate/Alternative Technologies). A quarterly newsletter—directory of, by and for people who are participating in transformation—people who are changing their own lives—people who are adopting alternative technologies, publised from Tranet, Box 567, ME 04970, USA.

2. *Ratadar* (Spanish). Bimonthly on rural agro-industries brought out by CITA—Ratadar Universided De C.R. Sanjose (Costa Rica) deals with appropriate technology work being done in that country.

3. *I.R.E.D. Forum* is a monthly communication tool of an international working network of 350 persent associations artisans and women's groups and institutions working for development at grassroot level. Published by IRED, Case 116, 3 ruede Varembe. 1211 Geneva 20 (Switzerland). Its Southeast Asia regional office is M.V. Rajasekharan, P.O. Bov 453, Bangalore.

4. *T.A.I.C.H. News*—a monthly bulletin (published by Technical Assistance Information Clear ing House, 200 Park Ave. South, New York, N.Y. 10003 U.S.A.) deals with socioeconomic develop-prograams ment abroad of U.S' voluntary agencies.

5. *Technonet Asia, Newsletter*: a quarterly published by 03-35/37, Singapore, 1130. deals with industrial technology and information.

6. *Peace News for Non-violen Revolution*: a fortnightly (publishec by Peace News Ltd. 8 Elm Avenue Nottingham-3, U.K.) deals with news and views movements against nuclear arms race and othervio-lent systems and about experiments for non-violent alternatives in all fields.

7. *International Exchange News*: a quarterly bulletin (pub. by the Washington International Center, 1630 Crescent Place, NW, Washington—deals with economic & scientific activities pertinent to development.

8. *Life*: A bi-monthly bulletin (pub. League of International Food Education, 915 Fifteen Str. NW, Suite 915, Washing-ton DC 20005) provides information in areas of food and nutrition.

9. *Children of the Green Earth*—a quarterly newsletter (pub. Children of Green Earth, P.O. Box 200 Langley, Wa. 98260 U.S.A.) deals with afforestation and tree planting efforts by the people the world over.

10. *IPPF Medical Bulletin*: monthly (pub: International Planned Parenthood Federation, 18-20 Lower Regent St., London SW 14 4 PW, England).

11. *Development & Change*: Quarterly (pub: on behalf of the Institute of Social Studies. The Hague by Sage Publications, 28 Banner Street, London, EC 148 QE. This is an interdesciplinary journal of a high academic order on proolems of development.

ABOUT US

Here at the Centre of Science for Villages we are taking up some of the critical technological problems of Rural India and are trying to find a solution to them in a way which conforms to the two dimensions of social justice and ecological soundness. We feel that for this limited work we should try to mobilise the needed assistance from our own country's governmental and non-govermental sources. Hence the general policy by which we go by is one whereby we do not seek assistance from abroad for such local experiments for which assistance can be got indigenously. At the same time we firmly believe in a global outlook and net-working of all efforts that are being made the world over. We would like to see that all individual efforts reinforce each other through linkages at all levels.

It is in the latter part of work that we feel assistance of the kind you could provide may be of help. The following are some of the spheres in which we could and do need outside financial assistance and which we consider to be right.

(i) In getting the literature and equipments in rural technology, (Appropriate technology) and all that it stands for from all over the world.

(ii) Assistance for travels for people of one group to other groups both for South-South dialogue as well as exchange with the Northern countries. That is for gaining specific knowledge and have give and take in the work that is being done.

(iii) For publication of such literature as is required for international level distribution and exchange.

(iv) Undertaking such projects where a particular technique has been proven in one country and the scientist of that country feel that it could be applicable in another country for which a joint programme for optimization and transfer can be jointly drawn out.

This thinking in the matter of international cooperation is essentially a partnership for bringing about a new world technology rather than have a donor-donee relationship.

True Art and True Science

True art and true science, says Tolstoy, can be recognised by their effect in clarifying our understanding and strengthening our love of goodness and beauty which have the effect of strengthening the ties binding people together in solidarity, Instead, we have much so-called art appealing to perverted emotions by exploiting violence, superstition and sensual appetite in the quest for large and easy profit. Instead of true science we have sciences driven by commercial greed and criminal science devising ever more horrific means of destruction; nuclear energy with its threat to the environment and armaments with their threat to all that lives.

Tolstoy confidently demanded that we all should will against our own baser wills, and create a world where children may grow into adults not obsessed with private acquisition and national "security", but strong enough to give to reduce suffering and to produce joy.

(From 'Manas'—May 84)

(Contd. from page 7)

ntroduction of improved chullah nd creation of smokeless villages .e.) which use only improved hullahs, bioga or solar cookers) as been started in a major way n all the States/Union Territories. ,000 improved chullahs have aleady been installed and 30 villages mokeless ; it is expected that 0,00,000 improved chullahs will e made smokeless. The proamme is expected to pick-up urther, as more models of imroved chullahs become available. IUDCO, a public sector housing gency, has been assigned a target f 1,00,000 improved chullahs for nstallation in the houses being onstructed by them for Economially Weaker Sections.

It is proposed that electricity ill be provided for at least 10,000 llages, from renewable energy ources in the Seventh Plan period f these, 220 villages are proposed be covered through photovoltaic stems during the current year elf. It is expected that integrated ergy projects in 100 villages will taken up in different parts of e country this year itself and ll fledged greatly extended proamme implemented in the venth plan.

(Abstract from the Keynote dress to the National Seminar on tegrated Rural Energy Systems, the author, Secretary, Dept. of n-conventional Energy Source, vernment of India.)

(*Contd. from page 26*)

12. *The Catholic Worker*: A bi-monthly bulletin (pub. Catholic Worker, 36 First Str. New York, NY 10003, USA) deals with peace development and non-violent life and action.

13. *Home Farm*: Bi-monthly (pub: Broad Leys Publishing Company, Widdington, Saffron Walden, Essex CB 1135 P; U.K.) is a full fledged magazine dealing with rural farming with animals and small holdings in all its aspects.

14. *Eco-development News*: an English Quarterly (pub: International Research Centre, on Environment and Development, Marson Des Sciences De L'Hommes, 54 Bontevard Raspail, Room 311, 75270 Paris Cedex 06, France) deals with ecology, environment, development, renewable energy and similar subjects.

15. *Self-help Spotlight*: six issues yearly (edited by SHARG community limited, Alexander House, 140 Battersea Park Road, London SW 11 4 NB) gives information on self help work training programmes especially for disable people and other people also.

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blished by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor: Devendra Kumar,
Managing Editor : Rajiv Gupta
torial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha-442001, Maharashtra, and
ed at : Swatantra Bharat Press, Esplanade Road, Delhi—110006.

FD-36

SCIENCE FOR VILLAGES

ilding a Bridge beetween the Science Lab and the Village Mudh

1 April 1985, Monthly, Annual Subscription : Rs. 15/- (10 Dollars) Individual and Rs.25/-(15 Dollars) Institut

Which way blows the wind ?

The U. N. General Secretary in his statement to the last session of the General Assembly on 12th December candidly spoke out his feelings with depth when he said, "As I look across this Hall, I see the delegations of 159 member nations. Almost all the world's peoples are represented here. And all of them – all of us–live under the nuclear threat. As Secretary – General of this Organization, with no allegiance except to the common interest, I feel the question may justifiably be put to the leading nuclear – weapon Powers: by what right do they decide the fate of all humanity ? From Scandinavia to Latin America, from Europe and Africa to the Far East, the destiny of every man and every woman is affected by their actions (....) The responsibility assumed by the great Powers is now no longer to their populations alone : it is to every country and every people, to all of us."

What is becoming clearer day by day is that the threat of nuclear holocaust is not something which will destroy the earth someday in the future but that it is vitiating every moment of the very present times by instilling fear of the worst type in the minds of the living generation. The growing competition, tension and subsequent insecurity and fear generated by the direction in which the economy of the world is moving with progressive speed has got to be reversed if the threat of the Bomb – which is its cumulative resultant – is to be avoided. The concerned nations can bury the bomb only when the causes are no more.

In this context it is somewhat reassuring that a commercial analyst and well known pragmatic economist of U. S., John Naisbitt in his recent book sees in U. S. a healthy change. Some of these new trends according to him are a progressive shift :—

From an industrial society to an information society
From a national economy to a world economy
From short term to long term
From centralization to decentralization
From institutional help to self-help
From representative democracy to participatory democracy
From hierarchies to networking
From either / or to multiple options . .

What is being seen in one of the great Powers, the most technologically active and predominant of the nations, has its reflections in all the countries of the world. It is not only the economic goods that flow from industrialised to less developed countries and from urban to rural sectors but along with it, ideas and trends also flow in the same direction. In India too the counterpart of the above trends could be traced. But it is possible that the motion is not easy to discern properly because it is very slow. The trends always take place first in the minds of the thinking people, gradually spread on and ultimately take shape into actions.

(Cont. on page-16)

from the labs

Cool Chamber to Preserve Vegetables:

The main materials required in the construction of a cool chamber to store roughly one quintal of fruits and vegetables is 350 bricks and 10 bags of riverbed sand, costing about Rs. 200. The Brick-made storage space has double layered side walls with a space of 7.5 cm between the two layers. This space is filled with river-bed sand. The top of the storage space is covered with khaskas or gunny bags in a bamboo structure. Once the chamber is sat-urated with water, sprinkling only in the morning and evening is sufficient to maintain the required temperature and humidity. The chamber ensures preservation of vegetable and fruits for 4-7 days in marketable condition in summer months. The shelf-life of leafy vegetables stored in the cool chamber is 3 days in May-June (as compared to one day outside).

Contact: Indian Agricultural Research Institute, New Delhi.

Insulating bricks from rice husk ash:

Insulating bricks which prevent heat loss are extensively used in various types of industrial furnaces, ceramic kilns, steel plant furnaces and cement plants as well as in non-ferrous and petro-chemical industries and power plants.

The Central Glass & Ceramic Research Institutes (CGCRI) Calcutta, has developed a process for making insulating bricks from rice husk ash. The process is significant, because, besides utilizing a waste material, it eliminates the slow and tedious procedures of hand moulding, slow drying and control firing. The bricks need curing 400-500 °C for attainment of the requisite properties for their use upto 1300 °C.

The process is simple and suitable specially for the small scale sector. It is estimated that a unit with a capacity to produce 1,50,000 bricks / annum would need an investment of Rs. 8.50 lakh; the return on investment works out to be around 30%. Such a unit will generate employment for about 30 workers.

(CSIR NEWS – 15 March 85)

Research Innovations In India

In India only 17 per cent of the technologies released by the Council of Scientific and Industrial Research (CSIR) were actually commercialised and that too after considerable modifications.

The number of innovations here were comparable to industrialised countries but the basic research contributing to major technological break–through was non–existent and improvement oriented innovations were not significant.

The study was conducted by the National Institute of Science, Technology and Development Studies (NISTADS), New Delhi.

Subsidies on devices using solar energy

The Department of non-conventional energy sources is subsidising the installation of devices like solar hot water and solar air systems, solar dryers, solar wood seasoning kilns and solar desalination systems under an extension programme relating to low great solar thermal devices.

The solar hot water system installed today at Poor House, Kingsway Camp, under the scheme has a capacity of 2000 litres per day at 60 degrees C. Such facility has been provided to the poor for the first time in the country.

Hot water from the system will be used for kitchen and laundry applications. The system is expected to save a minimum of 120 kwh of energy per day.

Water Hyacinth

Water hyacinth. The very name stirs visions of problems in agriculture, irrigation, navigation and drinking water supply in India and many other tropical countries where the spreading water hyacinth is a serious menace. No wonder the question of how to make this destructive water weed into a useful material has long been the main preoccupation of many agronomists. It now appears that water hyacinth could well be used for manufacturing packing paper and hardboard for use in construction work. At a special international conference on water Hyacinth Management held not long ago at Hyderabad, organised by the Indian Council of Scientific and Industrial Research, experts revealed that the pulp of hyacinth plant mixed with pulps of jute stalks or waste paper gives a better quality of paper. Not only that. It has been found that the stalks of the water hyacinth instead of the whole plant also improves the quality of the paper and paperboard products.

In addition, researches have proved that the vegetal invader,' as water hyacinth is aptly known can also be used to make compost for the bio–fertilization of agriculture and horticultural fields or as a fertiliser in ponds for fish–farming, or in developing low-cost community biogas plants using local materials.

Water in an age of Scarcity

By Sandra Postel

Each year, the sun's energy lifts some 500,000 cubic kilometers of water from the earth's sufface -86 percent from the oceans and 14 percent from land.

An equal amount falls back to earth as rain, sleet, or snow, but fortunately not in the same proportions. Some 110,300 cubic kilometers falls over land (excluding Greenland and Antarctica), whereas only 71,500 is evaporated from it. Thus, this solar-powered cycle annually distills and transfers 38,800 cubic kilometers of water from the oceans to the continent to complete the natural cycle, the water then makes its way back to the sea as "run off."

Today, humanity's annual water withdrawals equal about a tenth of the total renewable supply and about a quarter of the stable supply that which is typically available throughout a year. Agriculture claims the lion's share of world water use, accounting for about 70 percent of total withdrawals.

Roughly a third of today's harvest comes from the 17 percent of the world's cropland that is irrigated. Irrigation thus greatly helps meet the challenge of feeding an ever-growing population. Since 1950, the irrigated areas worldwide has increased from 94 million to 261 million hectares.

Non-farm use

Industry is the second major water-using sector of society, accounting for about a quarter of water use worldwide. Producing energy from nuclear and fossil-fueled power plants is by far the largest single industrial water use.

Excluding energy production, two-thirds of the remaining industrial withdrawals go to just five industries: primary metals, chemical products, petroleum refining, pulp and paper manufacturing, and food processing.

Industry typically accounts for less than 10 percent of total withdrawals in most Third World countries, compared with 60-80 percent in most industrial nations.

Water used by households-for drinking and cooking, bathing, washing clothes, and other activities -varies greatly with both income levels and the way in which water is supplied. In urban households with piped water available at the touch of a tap, daily use typically ranges between 100 and 350 liters person.

Mounting pressures are currently manifest in pervasive pollution, depletion of groundwater supplies, falling water tables, and damage to ecological systems. Failure to heed these signs of stress, and to place water use on a sustainable footing, threatens the viability of both the resource base itself and the economic systems that depend on it.

Without adequate treatment, the growing volume and toxicity of wastes could render as much as a fourth of the world's reliable supply unsafe for use by the year 2000.

Irrigation

Vast quantities of the earth's water move slowly underground through the pores and fractures of geologic formations called aquifers. Some hold water thousands of years old and receive little annual replenishment from rainfall. Like oil reserves, water in these 'fossil aquifers" is essentially nonrenewable, if tapped, it will in time be depleted.

Since agriculture claims the bulk of most nations' water budgets and is by far the largest consumer, saving even a small fraction of this water frees a large amount to meet other needs. **Raising irrigation efficiencies worldwide by just 10 percent, for example, would save enough water to supply all global residential water uses.** Vast quantities of water seep through unlined canals while in transit to the field, and much more water is applied to crops than is necessary for them to grow. The rising cost of new irrigation projects, the limited supplies available to expand watering in many areas, and the high cost of pumping are forcing governments, international lending agencies, and farmers alike to find ways of making agricultural water use more efficient.

Most irrigation experts agree that the actual efficiency of water use obtained in the field depends as much on the way the irrigation system is managed as on the type used.

Although drip irrigation may be inherently more efficient by design, the wide average range of efficiency for each system- 40-80 percent for gravity flow, 75-85 percent for a centre pivot sprinkler, and 60-92 percent for a drip system-shows that management is a key determinant.

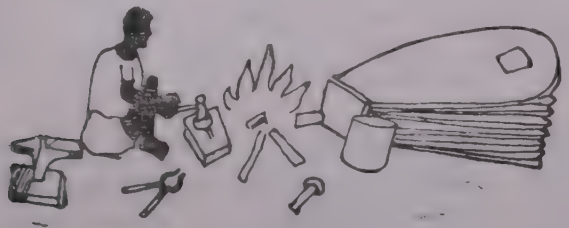
Limits

Much of the profligate waste and inefficiency in today's use of water results from policies that promote an antiquated illusion of abundance. People rarely pay the true cost of the water they use. Economists often suggest pricing water at its marginal cost.

Finally, planners and educators must dispel the myth that conservation is exclusively a short-term strategy to alleviate drought and other immediate crises.

In an era of growing competition for limited water sources, heightened environmental awareness, and scarce and costly capital, new water strategies are needed. Continuing to bank on new large water projects, and failing to take steps toward a water-efficient economy, is risky. Vital increases in food production may never materialize, industrial activity may stagnate, and the rationing of drinking water supplies may become more commonplace.

(Abstracted from WORLD-WATCH PAPER No. 62 of Worldwatch Institute 1776 Mass. Ave. N.W. washingtion Dc. 20036 U.S.A.) ☆ ☆



March Of Rural Technologies

Rural housing technology in Tamilnadu:

In the International Institute of Environment and Society (IIES) and the Science Centre, Berlin a project of international cooperation is being prepared. Together with the Building Technology Division of the Indian Institute of Technology in Madras, the project team will be gathering and developing appropriate technologies for rural housing in India. During the 2 year period yet-to-be specified development measures will be implemented for the rural population in the Madras region. The plans concerning this measure being prepared among the possibilities are housing programmes using appropriate technologies (with cheap durable and locally produced materials), a training programme for builders and the promotion of local village industries. The specific details were decided upon in the winter of 1984 when scientists from India and Germany joined for the first of several mutual exchange meetings. In the course of the project, which is financed by the German Academic Exchange Service, the Indian partners will spend two months in Germany to learn on basic need strategies taking place there. In Exchange, German scientists will visit India to be informed about the wide range of Indian activities going on in this field. (GATE, Federal Republic of Germany.)

Gandhigram (Madurai):

The Physics Department of Gandigram Rural Institute in conformity with the objectives of the faculty of Rural Oriented Sciences ventured to break fresh grounds to take science to the villages by starting what are known as Village Science Clubs. The attempt was the result of the realization that the over all development of the country can be achieved only by taking science to the masses.

Biogasplant savings-an example

Under the auspices of the Trichy Sarvodaya Sangh, Trichy, a 60 cu.m. institutional bio-gas plant was installed in the hostel premises of the Faculty of Agriculture, Annamalai University, Chidambaram at a cost of Rs. 1,00,000. The plant will be fed roughly with 1.5 tonnes of fresh dung daily which is obtained from the Department of Agriculture. It will produce2,120 cu. ft. gas everyday which will be used for cooking meals for 300 inmates of the hostal. Savin fuels such as firewood and coal valued about Rs. 6,000 per month. Considering the cost of Rs. 1,000 per month in maintaining the plant and handling dung, it is likely to result in a net saving on fuel charge of Rs. 5,000 per month.

Pakistan rural technology

Pakistan is giving a special place for rural technology in its research and development plans. Rural technology Divisions have been set up at all laboratories of the Pakistan Council of Scientific and industrial Research. (PCSIR) and now they have started functioning as full-fledged divisions in all the three laboratories of the Council.

The basic rationale for their establishment was the maintenance of a close rapport between the scientist and the villager so that they might come closer to each other to inculcate a technology-mind among the villagers.

At the Peshawar Laboratories of the Council, training of men and women from rural areas, and of officials from private and government organizations in dyeing, carpet making, etc. are in full swing.

Work is also being carried out on a large number of dye-bearing plants. The fastness of these vegetables dyes on wool is being studied as the wool industry is important to the rural areas in Pakistan.

In addition to the already on-going activities in biogas, Solar dehydration, etc., the newly created Rural Technology section of the Lahore laboratories has started pottery manufacture also. The technology is expected to boost the income of the villagers.

(PCSIR Annual Report)

WHICH WAY APPROPRIATE TECHNOLOGY?

By Godfray Bojle

To many people today 'technology' has become a dirty word. Rightly or wrongly, they hold it responsible for many of the problems which have beset 20th century western civilisation ; problems like unemployment, pollution, centralisation of power, depletion of resources, and the arms race.

But why has technology failed to become the emancipator of humanity, and become instead the instrument by which the emancipation of the few is achieved at the expense of the enslavement of the many and the technological knowledge has been abused by elites seeking only to buttress their own health or power ? Or is it due to inherent defects in the notion of technology itself ? or is it just the fault of poor engineering, and capable of being remedied by a dose of Good Design ?

Gowth of the idea

The idea of 'alternative technology' arose in the early 1970 s as a reaction to two things :

The first was the perceived failure of 'conventional technology, which was making itself evident in problems like pollution, the depletion of resources, alienation, soul-destroying work, and the centralisation of power and knowledge. To solve these problems, a radically new approach seemed to be required.

The second was the notion of technological determinism : the notion that social 'progress' is driven inexorably by a narrow, linear process of steady technological advancement.

Alternative technologists rejected the idea that technology is simply a neutral repertoire of tools and techniques that expands ever onwards and upwards, irrespective of the values and beliefs of its practioners (technologists) and the society in which they are embedded. We challenged the widespread belief that technology can take only one immutable direction and that society has little choice but to follow suit. We argued that societies can, and do mould technology to suit their needs and values, that there is, indeed an extremely wide range of technological possibilities within which we can choose those tools and techniques which suit our social and political purposes.

Specifically, we argued that our society could, and should, select a new set of tools and techniques that would help promote a more sustainable, more ecologically-conscious, more equitable, more peaceful society.

'Alternative technology' was just one of a family of similar concepts that gained widespread currency during the 1970s though the origins of some of them stretch back many decades. The members of this family include Fritz Schumacher's 'Intermediate Technology', Murray Bookchin's 'Liberatory Technology', Ivan Illich's 'Convivial Technology', Karl Hess and David Morri's 'Community Technology' and Robin Clarke and Peter Harper's 'Soft Technology'. The family also includes 'Radical Technology', the term which Peter Harper and I employed for a book of the same name, and ofcourse the all-embracing 'Appropriate Technology'.

Right and Left

The early advocates of 'A.T. stressed the need for potential change to go hand-in-hand with technological change. As David Dickson put it : ".... a genuine alternative technology can only be developed, at least on any significant scale, within the framework of an alternative society, and the achievement of this is a political task. The struggle for emancipation from an apparently oppressive and manipulative technology coincides with the struggle for emancipation from the oppressive political forces which accompany it."

Since its inception, however, alternative technology has, in effect branched out into a number of different paths. The advocates of each path are largely in agreement about the need for environmental protection and resource conservation. But they differ markedly in the extent to which they espouse radical social and political change.

Over the past ten years or so, the pathway followed by the more conventional, more conservative 'Right wing' of the alternative technology movement has been very different to that pursued by the more radical, more socialist 'Left wing'.

The conventional approach to A.T. has been surprisingly successful, in terms of rapid technical progress, steep reduction in hardware costs, and increasingly widespread practical demonstrations.

But what has been the fate of the more radical stream of AT, the stresses the need for a changed social and political context as a framework for technological and environmental improvements ? In the increasingly-hostile political and economic climate of recent years, this wing of the AT movement has faced an uphill struggle, but has made some significant progress despite the difficulties.

In Europe, the ideas of 'Radical' political acceptance have been adopted by the most successful 'Green' party in Europe, the West German Die Grunen : they can be found in the manifestoes and pronouncement of the other green-tinged parties of Europe, in countries like Denmark, Sweden, Belgium and Holland ; and they figure prominently in the literature of the green 'ginger groups' attached to the more traditional parties, such as Britain's Socialist Environment and Resources Association (SERA).

In short, considerng the difficulties, it is surprising how much headway the radical wing of the AT movement has made in the last ten years.

What, then, does the future hold for both 'radical' and 'conventional' alternative technology ?

I think that it is likely that 'conventional' A.T. will continue the process of technical development, cost reduction and increasing development which we have seen over the past decade. Much of the hardware and know-how so produced will be of value to the more radical wing of the AT movement, though some of it will require adaptation to suit more rigorous social and political criteria.

In my view the future of the 'radical' AT movement lies, as the Chinese say, in 'putting politics in command, as members of the wider ecology movement we must decide, as best we can, the broad characteristics of the society towards which we want to work, and the values which should sustain it ; then, as alternative technologists, we must develop the tools and techniques that can help make it happen.

The future development of 'radical' AT should therefore go hand in hand with attempts to create a more ecologically-conscious, more egalitarian, more convivial society in our fields, factories and workshops, our homes and communities.

Finally, I think that AT needs a change of image-and that requires change of name. The phrase 'alternative technology' has acquired such a wide variety of meaning that it has now become almost meaningless. I think the term which best expresses what 'alternative technolgists' are trying to do is 'ecotechnics', which I would define as :

"those tools and techniques, those items of hardware and software, equipment and related technical knowledge, which can help create a more ecological society.

In this context, the word 'ecological' should not be quoted in the narrow sense in which the term tended to be used in the 70 s, to mean simply the conservation of the environment and of material resources. It needs to be given the broader interpretation given to it in recent years by the Green movements of Europe, an interpretation which also emphasises the urgent need for greater equity between people, regions and nations, for decentralisation of political power and social institutions, and for peace and disarmament. Eventually, ecotechnics could become as commonplace and as useful a concept as its cousins, ecology and economics.

* *

("Resurgence" : the monthly from England representing E.F. Schumachaer's philosophy and much more in its Jan-Feb. issue has incorporated another journal "Undercurrents'. Godfrey Boyle of Open University and till now editor of 'Undercurrents' has in this issue analysed the A. T. movements past, present and future. this is an abstract from the same - Editor).

Bottlefeeding Plant Roots — the best irrigation

By R. K. Yadav

Soil contains 1/10-1/3 atmospheric pressure at field capacity to about 15 atmospheric at willing point. None of the irrigation methods developed so far including trickle irrigation – the recent irrigation technology– adapts soil energy for operation with the result that it India only about 24.3 per cent area of the net area under cultivation is irrigated.

About 50 to 75 per cent irrigation water is lost by run-off, seepage, percolation, field and surface evaporation from the water source to the root zone. The net agricultural production can be increased by bringing down more area under cultivation with efficient utilization of present irrigation methods and water resources, which can be achieved by harvesting soil energy and making the field and root zone as reservoirs.

If a porous cup or pitcher, made of potter's soil (clay) filled with water is placed in the dry soil keeping the free water surface in the cup open to atmosphere and its wall covered with dry soil, all the water from the cup or pitcher will seep into the soil. The seepage or movement of water from the porous cup to the soil takes place due to the soil suction or soil water tension This principle is utilized in the suction irrigation.

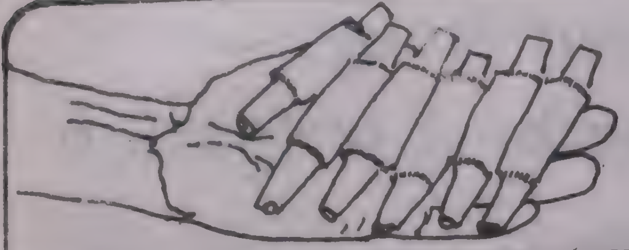
In this irrigation system fired hollow porous cylinders (emitters) made of cowdung and clay soil embedded in the root zone of plants are connected by connecting tubes. The emitter and connecting tube are filled with water after removing the entrapped air. All the joints of emitters and tubes are made air tight to make the suction line in the rows of plants free of air.

The seepage of water from the wall of emitter takes place due to the soil suction. This continues till the sum of resistance head of emitter against the flow of water and frictional losses in the pipe, emitter and negative static head equal the soil water sunction or tension of root zone of crops.

The soil and/or plants unlike other methods of irrigation may be irrigated continuously throughout 24 hours and throughout the life of plants at the moisture content in the root zone less than or equal to field capacity of the soil. The automation of irrigation is governed by soil-water-plant system and negative static head applied to the tank. No external mechanical or hydraulic power is required to cause the flow in the tube and into the emitter and soil interface.

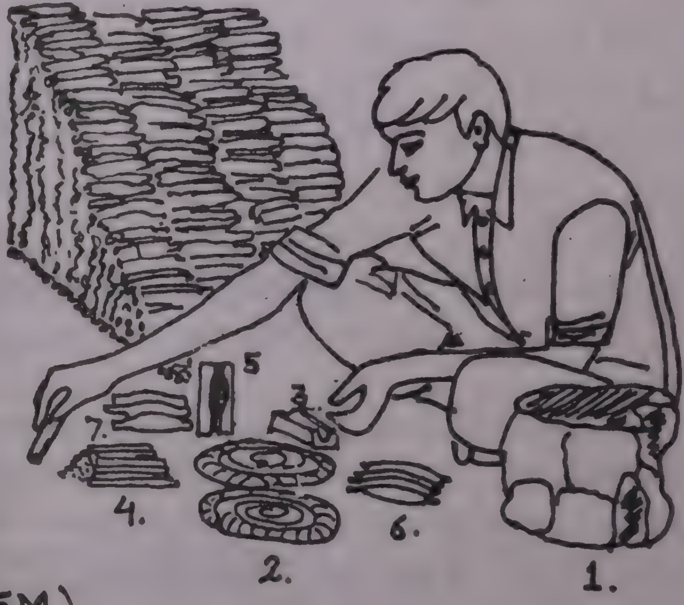
The suction irrigation system consists of (a) heart and (b) tail component. The heart component comprises a tank and an air tight regulating valve. The capacity of tank depends on the evapo-transpiration rate of the crop to be cultivated. Usually, a tank having 3000 litres capacity is found enough to irrigate one hectare of brinjal, tomato, cauliflower, cabbage, knolkhol, water melon, musk melon etc. on daily basis.

The regulating valve supplies the water and water mixed fertilizer, pesticides and insecticides to feeder or main pipe. The tail component is the main feeder pipe with laterals spread on the field in rows. The laterals hold the emitters through which irrigation water seeps into the plant root zone due to soil and or plant suction. The emitter serves as conduit, reservoir to the succeeding emitters and sensor for water emission.

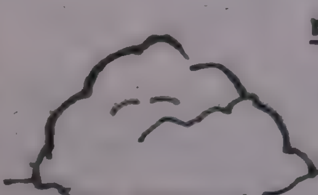


BOTTLE FEED-

1. CLAY
2. CLAY COIL
3A. MALE MOULD 3B. FEMALE MOULD
4. STRAW (SACCHARUM MOONJA STEMS)
5. MOULD WITH ROLLED CLAY AND STRAW
6. EMITTER OUT OF THE MOULD WITH STRAW
7. EMITTER WITH A THOROUGH HOLE AFTER THE STRAW IS REMOVED
8. FIRING OF DRIED EMITTERS (CLAMP SYSTEM)



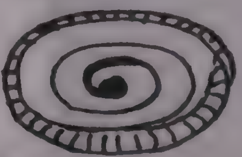
1.



POTTERY CLAY MIXED WITH 50% HORSEDUNG TO ATTAIN 30% PORASITY

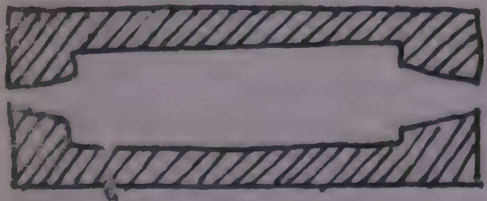
3½ Kg. CLAY = 100 EMITTERS

2.

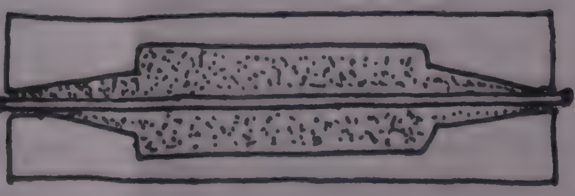


CLAY COIL TO FACILITATE FASTER MOULDING OF EMITTERS

3.A

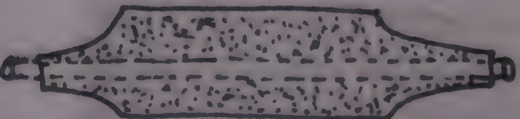


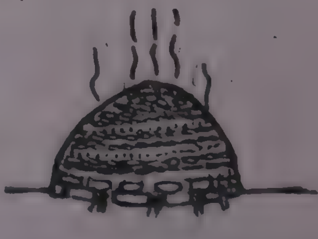
5.



4.

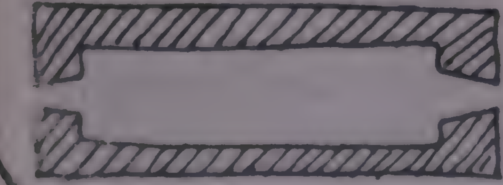
6.





8.

3B



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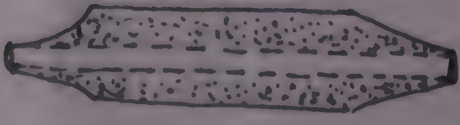
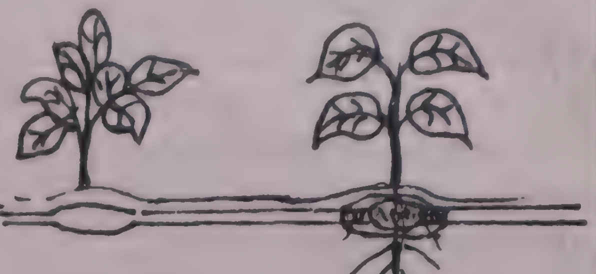
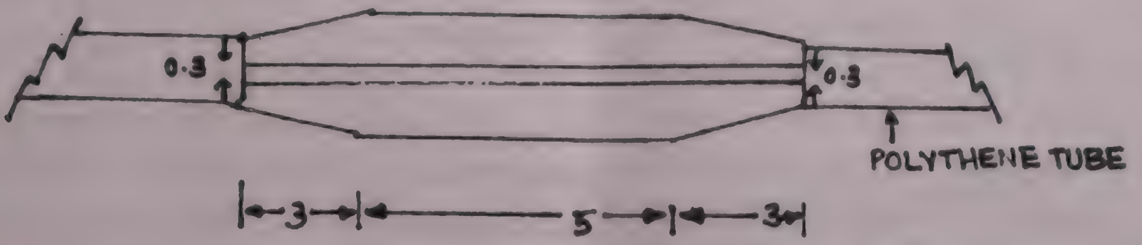


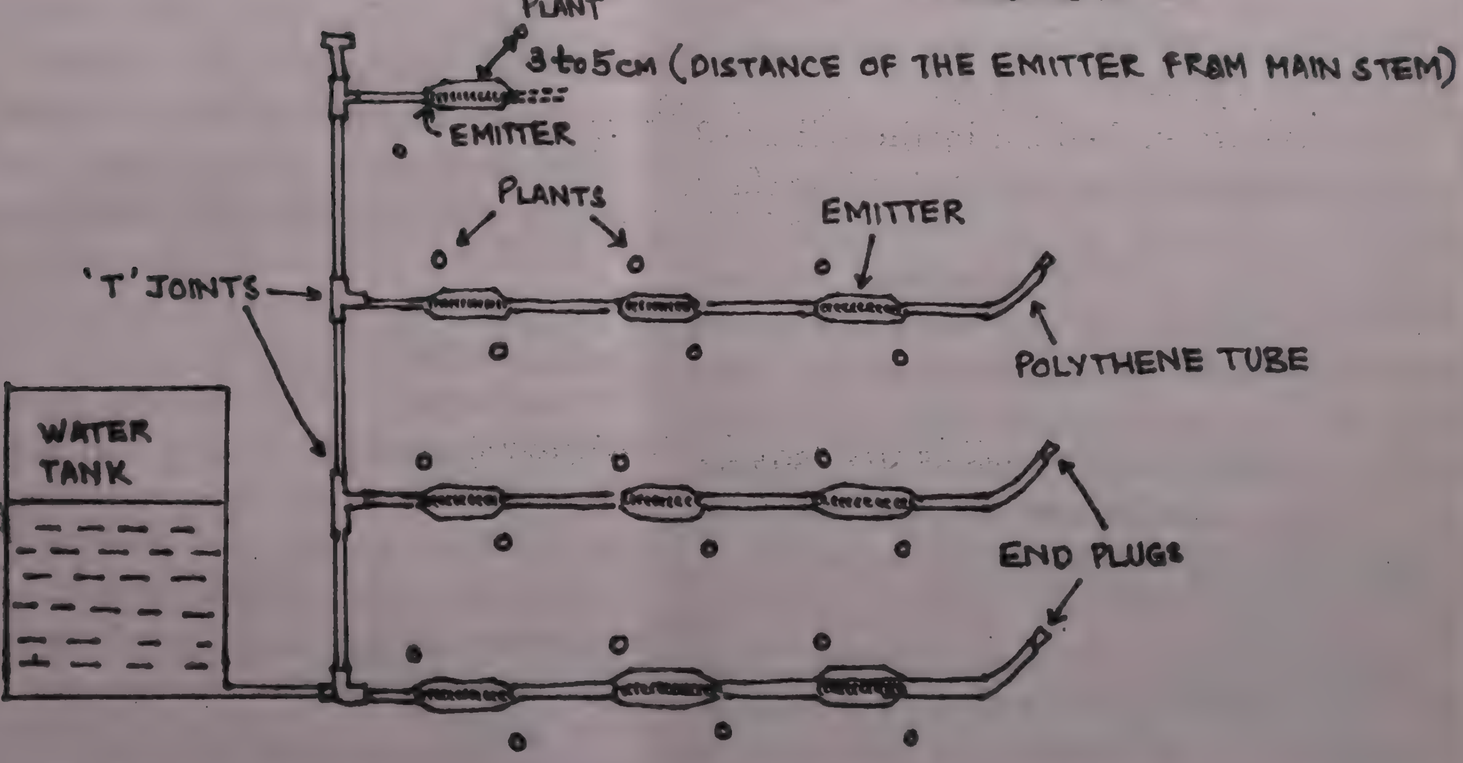
SFV. APRIL. 1985.

ING PLANT ROOTS

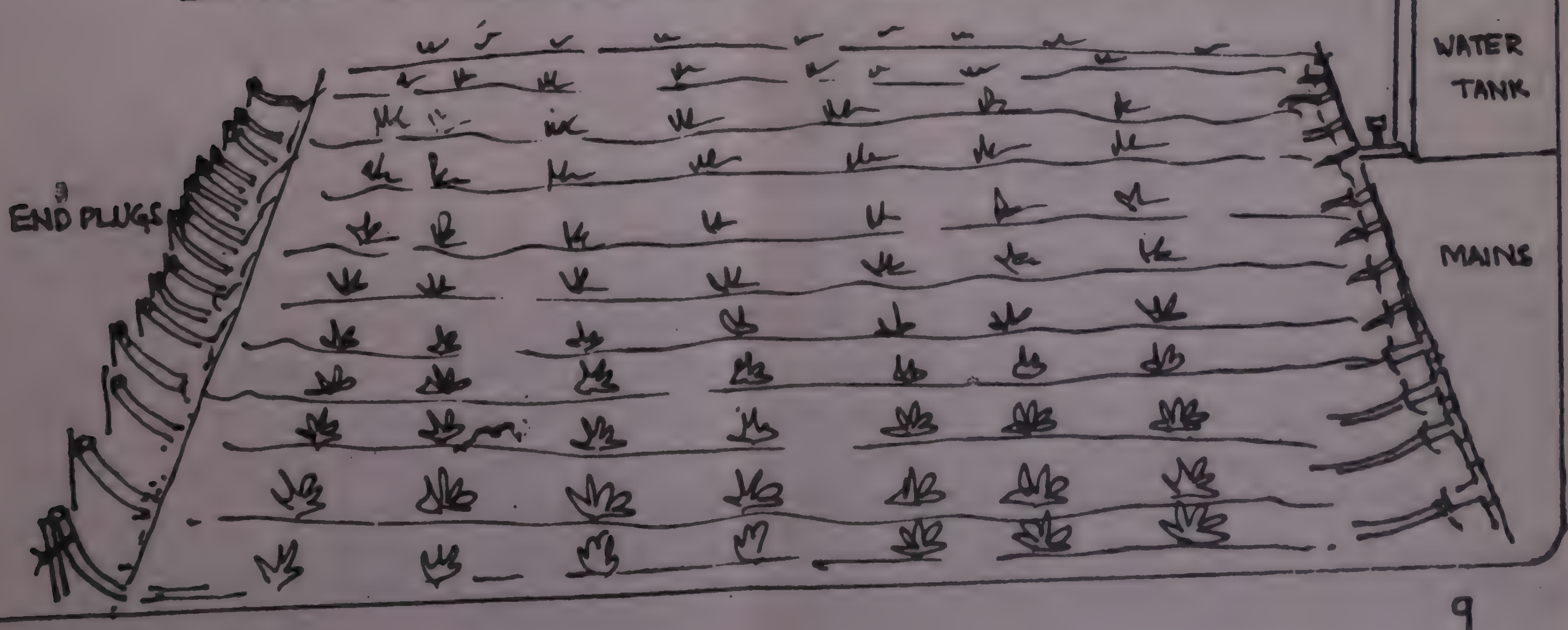



0.3
0.3
POLYTHENE TUBE
3
5
3

DIMENSIONS IN CM


PLANT
3 to 5 cm (DISTANCE OF THE EMITTER FROM MAIN STEM)
EMITTER
PLANTS
EMITTER
'T' JOINTS
POLYTHENE TUBE
WATER TANK
END PLUGS

EMITTERS AND POLYTHENE TUBELINE EMBEDDED IN THE SOIL


WATER TANK
END PLUGS
MAINS

The main variable which are considered in designing the system are suction of soil and/or plant, plant to plant distance and line to line distance, volume of soil occupied by the root zone of the plants, evapo-transpiration rate and area of the emitter exposed for the suction.

It is estimated that more than one metre of head in the form of soil suction is always available at each emitter in the root zone depth of soil. An emitter with internal diameter 4 mm, external diameter 20 mm and length 100 mm was found most suitable for irrigating brinjal, tomato, cabbage, cauliflower, knolkhol, water melon and similar other vegetables and fruits.

Emitters are embedded in the soil at 10 to 20 cm depth from the ground surface preferably below the coown root to harvest expillary water and to minimise surface evaporation The horizontal distance between the emitter and plant depends on the diameter of tap root of the plant. Usually emitters are laid at a distance of 30 to 50 mm from the main stem or tap root to save the emitters from the pressure of enlarged roots. For irrigating fruits like papaya, banana, pomegranate bigger sizes of emitters than the described above may be used with vertical arrangements in or around the root zone of the plant.

Fabrication of Emitter

Ordinary soil used for the fabrication of earthenwares like pitcher, tile, bricks are used along with fresh cow dung free of straws for the fabrication. Dung is used with the soil to increase the porosity and thereby the seepage rate through projected area of the emitters and to prevent cracking in the emitter, while it is in the process of drying.

Experimental tests revealed that 30 to 120 per cent of fresh cow dung by weight, mixed with dry soil is used for fabricating the emitters The amount of dung must be increased or decreased depending on texture, structure, void ratio, pore spaces and moisture holding capacity of the soil.

The soil mixed with water and dung is put in the woaden frame or mould of a desired shape and is rolled into the solid state. The stem of Saccharum moanja, Saccharum spontanum or similar other straws or woods with 3 to 5 m. m. diameter and 100 mm straight length is placed in the frame, which provides a through hole in the direction of the emitter. The dried emitters are placed in the kiln to get the required properties.

The suction irrigation is different from surface, sprinkler and trickle irrigation systems. In conventional methods of irrigation, including trickle and sprinkler the water movement to field and plant root zone takes place due to external power source in the form of prime mover or an overhead tank while in the suction irrigatian, soil and/or plant suction controls the movement and emission of water. In this method the irrigation to plant can be automated and made continuous by the soil and/or plant itself, whereas in the trickle irrigation the same operations may be achieved by mechanical, hydraulic or electronic devices.

Unlike conventional methods of irrigation, suction system may be adapted on slopy field and thereby the cost of installation of overhead channels and tanks and land levelling may be saved.

The system eliminates leaching down of fertilizers, seepage, percolation losses, transportation of manures, fertilizers and organic matters to the lower levels of field and minimises surface evaporation losses because it employs the feeding bottle technique. The continuous maintenance of the optimum physical conditions for the plant growth, by keeping proper soil-water-air proportion in the optimum range, promotes better returns from the crop in quality and quantity.

THE ROLE OF WOMEN IN NUTRITION

By Maria Angelique Savane

(The Author, President of Association of Africa Women for Research & Development, writes on the implications for women and their work of introducing nutritional considerations into agricultural and rural development projects – Editor.)

The role of women in nutrition is conditioned by their status in the reproduction process. They carry and give birth to children, nurse them, care for them, and prepare them for their adult life. The nutritional aspect of the question starts at conception and follows the various stages of procreation.

During pregnancy, it is the woman who transfers to the foetus the nutrients necessary for its survival and development. The health of the pregnant women is therefore of decisive importance during this period.

Jelliffe underlines "the vital interdependence between the nutritional health of the mother, foetus and infant." For him, "An inadequate diet for women, especially in pregnancy and lactation, has not only direct nutritional importance for the foetus, but can lead to maternal depletion,' often cumulative with each peproduction cycle. The result is an increased maternal and prenatal mortality and morbidity of great importance to the whole family, including previous young children still so dependent on the mother's care and attention, especially in feeding".

After weaning and the introduction of solid foods, the role of the mother is even greater. It is she who has to produce or purchase the food that the young child needs, and also choose and prepare this food. This crucial period in the growth of the child requires great attention and knowledge on the part of the mother.

Women also have a major responsibility in feeding the adult members of the family.

(Contd on p. 12)

By keeping the upper soil layer, the soil layer above crown root, dry and maintaining high temperature of the soil surface, the system hastens maturity of the produce. This also controls weed, insect and pest problems. By keeping the root zone moist and cool, the tendency of leaf shedding is minimised. The uniform water and fertilizer distribution to the plant root zone yields in uniform crop maturity. The volatilisation of ammonium fertilizers is eliminated due to slow and continuous application of ammonium fertilizer to the plant root zone.

The average cost of suction irrigation per hectare varies between Rs. 2,500 to Rs. 5,600 assuming the life of PVC lateral pipes to be five years which is half of the cost of trickle irrigation for a grid of laterals 1 x 1 or 5 m x 0.5 m respectively.

The cost will be reduced in the case of orchards as the spacing are much wider than the vegetables. The initial iuvestment and operational cost will work out much lower than the trickle and sprinkler units. The ease with which the irrigation water to the root zone is controlled by soil suction and fertilizer supplies is rationed, reduces the labour cost, besides water and fertilizer requirement considerably. These advantages are unique in suction irrigation system. Further, in highly permeable soils, where millions of hectares of land remains uncultivated for the want of ground water, electrical power and supply of diesel, the area can be put into the cultivativation by lifting the water by animal or man-drawn water lifting devices. ★

It is they who procure and produce and process the elements necessary to feed the family. It is they who choose the menu and decide on the amount of food required and how it is distributed among the different members of the family.

In traditional agricultural societies, women, recognized as food producers, were afforded social and economic rights as duties. But the old methods of production have been overturned by the integration of these societies into the international division of labour. The development strategies devised for this purpose, both during the colonial period and later, have changed the patterns of production and introduced new crops and new cultivation techniques. This has also had repercussions on the division of labour by sex and age, on the land ownership system, on the causes and types of migration, etc. women have been particularly affected by changes that have occurred.

Cash Crops

In agriculture, the development of cash crops has changed the division of labour by sex. The men have specialized increasingly in commercial agriculture, while the women have continued to grow the food although taking an active part in producing income from the family field.

The mechanization of certain agricultural tasks and technical innovations often prolong women's working day and make the work heavier. in many cases, although, these increase women's participation in the family workforce, they do not result in any rise in their incomes. This new division of labour between the sexes has had repercussions even on food habits. Thus, according to the study conducted by Bukh in Ghana, it seems that, as the men have become involved in growing cacao, they have had to stop producing yams because both crops have to be harvested at the same. time. The women consequently have had to take over the food coops.

In general, the introduction of cash crops has been effected at the expense of food crops, thus creating an ever-growing dependence on the industrialized countries for food.

The introduction of nutritional considerations into agricultural and rural development projects can-have a decisive impact on women and their work, but the effects will only be of real benefit of nutrition is just one aspect of a vast programme aimed at meeting the specific needs of each member of the community (women, men, children, the aged).

Rethinking Rural Development :-

Meeting the nutritional requirment of each member of the community means changing the structures of production, the method of assigning the land, production techniques, the division of labour between the sexes, and the distribution of resources and incomes. For women this new orientation will have to take into account their roles in both reproduction and production defining the relationship between the two, their influence on the course and outcome of pregnancy and breastfeeding, and women's energy requirements during these periods, bearing in mind seasonal variations, food taboos, and prohibitions.

Taking into account the specific food requirements of women also means admitting that fatigue caused by the multiple stresses to which women are subjected should no longer be considered as "natural" but seen as the result of excessive physical and psychological burdens. This implies the need to lighten both the productive tasks of women, at both an individual and a collective level, through appropriate technologies and social structures.

CONCLUSION

The role of women in food production is decisive for the family's nutritional status. Any development programme aimed at meeting people's nutritional requirements must take this into account in planning activities and allocating resources. But success will be achieved only if there is the political will to call into question the preexisting production relations. The "invisibility" of women and their confinement to the domestic sphere of social production is not due solely to ignorance. It is based on the underlying nature of a class system in which one class estranges the others and takes advantage of the social and cultural oppression of women to profit from their status as unpaid workers.

Thus any strategy aimed at creating conditions for a better redistribution of resources and incomes that will enable each member, of the community to meet him or his basic requirements, particularly with regard to food must have as its starting point far-reaching structural change.

TRAINING COURSES IN RURAL TECHNOLOGIES

Centre of Science for Villages, Wardha is starting from 1st May 1985 five courses in various rural technologies. The training scheme being sponsored by Council for Advancement of Rural Technology (CART) set up by the Ministry of Rural Development, Government of India. The details of the courses are mentioned below :-

Sr. No.	Technology	Nature of Training	Duration	No. of Trainees per batch	No. of Batches per year	Date of initiation of courses
1.	Biogas Technology (Rural Biogas Technician)	i) Basics of biogas technology ii) Selection of site design & supervision of construction. iii) Construction of low cost biogas plants, fabrication of biogas bags, use of clay burners etc. iv) Repairy & maintenance of biogas plants. v) providing regular guidance to beneficiaries	3 months	6	3	1st May 85 1st Sept 85 1st Jan. 85
2.	Composting	i) Basics of composting. ii) Use of agrowastes & biogas slurry for composting. iii) Improved methods of composting. iv) Precautions during composting. v) Soil and compost analysis.	3 montns	6	4	1st May 85 15 th Sept 85 15 th Nov. 85 1st Feb. 85
3.	Rural housing & sanitation	i) Construction of fire proof & water- proof thatch roofs. ii) Construction of improved mud walls & stone blocks iii) Saving mud walls from rain water. iv) Construction of arched roofs without wooden under structure v) Simple latrines, soak- pits.	2 months	6	4	1st May 85 1st Sept 85 15 th Nov 85 1st Feb. 85

Sr. No.	Technology	Nature of Training	Duration	No. of trainees per batch	No. of batches per year	Date of Initiation of course
4.	village pottery	i) Demonstration of stokeless chulhas ii) Fabrication of clay wall & floor tiles. iii) Fabrication of clay biogas burners, sheetal pot (Village fridge), irrigation pipes etc	3 months	6	3	1st May. '85 15th Sept. '85 1st Jan. '86
5.	Banana Fibre paper Technology	i) Treatment of raw meterial, banana stem, preparation of pulp ii) Board and paper making. iii) Preparation of various articles like files, folders, boxes, baskets etc. iv) Preparation of asphalted boards to be used as roofing sheets.	3 months	6	3	1st May '85 1st Sept. '85 1st Jan. '85

Medium of instruction : Hindi / English

Facilities for the trainees :

1. Stipend – Rs. 300 / month
2. Lodging & boarding – arrangement near the field station (expenses to be borne by the trainee)
3. Travel – to and fro second class railway / bus fare.

How to apply

This is meant specifically for people deputed by voluntary agencies who would take up the propogation of the new technique in their areas of operation. The agencies are required to send suitable candidates from amongst their own staff who have requisite skill to imbibe the technology concerned and will later make use of it in their work in the institution. Very selected trainees are invited. The courses are kept of a short duration to enable the institution spare their good worker for the training programme.

Any voluntary agency which has its roots in the village, should send an application form duly filled addressed to :–

Training Director, Short – Term Training,
Course in Rural Technology,
Centre of Science for Villages, **Wardha** 442001 (Maharashtra Staet).

WINDOW TO THE WORLD

Green Dust Bin

According to estimates by Kassel Polytechnic, the households in West Germany produce over 20 million tonnes of refuse every year. The fact that this waste has a value that is lost if it is dumped on rubbish tips or incinerated is under lined by the Green bin project which was launched in the town of Witzenhausen in the northern part of the Federal State of Hesse The project got underway in 1983. At the end of the 12 month experimental phase, the team of experts from Kassel Polytechnic, who had devised it took stock of the situation and found that it had been a success.

The Green Dustbin project was developed in an attempt to overcome the problems posed by the excessive burden placed on local refuse dumps.

The organic domestic refuse is taken to a compost site by a special vehicle, mixed with organic waste from industrial concerns and left for about six months. It is then sold as compost. Nutritional analyses carried out so far have produced positive results, especially in comparison to peat that is normally used for fertilizing purposes. The twelve month experimental phase showed that the project carried out in Witzenhausen involved hardly any extra costs for the households who participated.

Burn it ? Recyle it ? 'Dump it into landfills that will soon fill up.' What to do with garbage has now become a million dollar question around the globe. A sustained campaign must be undertaken to educate the masses that there is cash in trash.

Chinese Herbal Tonic

The herbaceous peony (Peeonia lactiflora) is a perennial ornamental plant which belongs to the butter cup family. The plant's root tuber is peeled and processed into a medicine which has a bitter taste. In Chinese folk medicine, this is used as a tonic for the liver, spleen and blood. It is also used to treat anemia, abdominal and chest pain, dysentery menstrual disorders, etc. It is also claimed to be preventive drug for heart diseases.

According to the Chinese medicinal practice, there are three types of roots obtained from the peony. One type is straight, solid, even textured and white. Another variety is smooth with evenly shaped ends and red and white in colour. The third variety resembles the previous one, except that it is light-red in colour.

The herb is generally planted in late autumn. A year and a half later, the plant is dug up, as fibrous root is trimmed and its bark peeled off. It is then dried in the sun at specified times so as to prevent it from breaking and colour change. This is then further processed into a tonic, beverage, food, additive, etc.

Village-level Pasteurizing and Bottling System :

Associate Food Scientist Philip G. Crandall at the Univetsity of Florida Citrus Research and Education Center, informs L. I. F. E. of a new village level juice pasteurizer and bottling system, developed in collaboration with Janak Upadhyay of the Ministry of Agriculture, Nepal. The system was designed for use by Nepalese farming families who, according to Mr. Upadhyay, used to lose up to 50% of some citrus and vegetable crops as they had no way to preserve them for transportation to other areas for future home consumption. The system may prove of benifit to small farmers in other parts of the world who raise crops which have an acidic base, such as oranges, apples or tomatoes.

The pasteurizer, which costs about $50 to construct, is easy to build and light enough to carry in a backpack, can pasteurize about 1500 12-ounce bottles of juice a day. The materials for the system consist of a stainless steel coil, a garbage-type tin can surrounded by bricks, previously used bottles (in Nepal, beer bottles are being used), a portable bottle-capping device and a thermometer. The oven, designed to use locally available fuels, heats water in which the coil has been placed. The juice – extracted by hand – is run through the coil to bring it to a heat of 90 degrees C, then bottled and capped. The bottle is then turned on its side, so that the hot juice sterilizes the bottle and cap. As pasteurization destroys disease producing organisms, farmers can preserve the juice of these crops for sale or home consumption for upto one year after harvest if the bottles are kept cooled, or for three months without cooling, Professor Crandall, who has found a company to manufacture parts for the pasteurizer and now seeks funding to make the technology available to developing countries, can be contacted at the Center at : 700 Experiment **Station Road**, Lake Alfred, Florida 33850, USA.

* *

(Contd. from page 1)

The technologies which develop according to these trends are however not always healthy and what we expect to derive from them does not always happen. For example Micro-electronics, a set of scientific technologies, which arose as a consequence of applied scientific discoveries leading to the transistor and the silicon chip, biotechnologies like hybridomas and enzyme innovations, among other biological developments, are the two most consequential of the scientific technologies. All these are, characteristically, resource and energy conserving, relatively low capital demanding, ecologically acceptable and suitable for decentralized operations. These characteristics they share with traditional technologies, but additionally, they allow much greater production efficiency and wider scope of operation and therefore, are highly commercially viable. But unfortunately once endowed with commercial promise, a new technology can seek its own level of adaptation, often with little or no reference to social or political objectives. The primary beneficiaries are the swift and strong. Some secondary benefits may also be diffused to the middle strata in the course of time. And, as has happened before, there may be some detrimental effects which further marginalize the lower strata.

Hence the trends have to be well defined and the economic forces trimmed in the direction of social justice for the weak of the globe. With faith in the future of humankind, the economy of peace is to be built by the application of a new kind of technology. This seems to be one way to heed the warning of the U. N. General Secretary about the Bomb.

Devendra Kumar

CSV AT WORK

☆ Now reporting about our work. We are presently in full swing of activities. Two months back we started a leather project in which hides from naturally dead animals in the villages of Wardha are collected and processed and leather products made out of it. For this we have got three artisans trained at CLRI at Madras.

☆ Our rural housing wing is experimenting on mud blocks that are strong enough to make walls and have fired clay-tiles fixed on one face which will make it non-erodable from rain. We have undertaken to make 10,000 sq. ft. of housing which is being made by Sarva Sewa farms working for Bhoodan farmers in villages in the district Yeotmal.

☆ Banana stem boards-making work is also going on. We are collecting material which is a waste from Banana crops from villages round about, and these are being supplied by us to the PWD for use in an audtiorium for accoustic purposes.

The biogas section is active through a team of trained artisans and edgineers in undertaking training courses of masons in five districts of the area and is constructing about one thousand new gas plants every year.

The project for tools and implements in agriculture which local blacksmiths can make is continuing and selected tools are being got made by the blacksmiths and tried out by village farmers from whom feedback is being obtained.

Lime pozzolana cement is working only part time as and when orders are received. The product however is very good. In this trade what we need is some machinery for making cement articles like mosaic tiles etc. for which initial capital is yet to be managed.

Magan Chulha, smokeless cook-stove, is another programme for which we have been entrusted work in Vidarbha region and 93 training camps and 9,300 chulhas have been done in last two years.

Our two journals – 'Science for Villages' an English monthly and 'Gramopayogi Vigyan', Hindi bi-monthly are continuing with the help of DST assistance. Recently the Science & Technology Cell of Maharashtra has sanctioned for bringing out a fortnightly wall-poster in Marathi for the villages.

The first issue is out. We are busy posting it to 2000 identified groups and individuals who are working in the rural areas in Maharashtra. This colourful wallpaper will be stuck on public places like Panchayat building, bus stop, hospital or dispensary, Mahila Mandal, adult education classes, outside the village temple etc. It is sent free of cost, on request.

Published by : Devendra Kumar on behalf of Science for Villages, Wardha, : Devendra Kumar,
Managing Editor : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya Wardha 442001, Maharashtra,
Printed at : Paramdham Mudranalaya Paunar, for Samyog Press, (Wardha) – 442001.

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SCIENCE FOR VILLAGES

Building a Bridge between the Science Lab and the Village Mudhut

92 May 1985, Monthly, Annual Subscription : Rs 15/- (10 dollars) Individual and Rs. 25/- (15 Dollars) Institution

Energy and Progress

All industrial growth has been possible through the power that could be commandeered for production purposes. This was manpower or animal power in the initial stages but as technology progressed inanimate powers like that of wind and water were also added. These were renewable resources. The industrial explosion occurred only when mineral fuels like coal, petrol were harnessed. All these are capable of being converted into electricity, the most versatile and easily transferable of energies. Today we calculate the power available to a country by (not in Horse Powers as was done earlier but) kilowatt oil electrical energy. The non-industrialised countries still depend mainly on manual, animal or biomass as energy sources and their per capita use of energy remains at the prehistoric level of 2000 k. calories, per day (equivalent to the energy used in lighting a 100 watts light bulb for 24 hrs. According to the estimate of academician Andranik Petrosyants, chairman of the USSR Committee for the uses of Atomic Energy, (published in 'SPUTNIK' May 85), three quarters of the earth's population has per capita power consumption of only 450 watts. In contrast to this the richer industrial nations consume 2700 watts or 6 times more. In these rich nations, U. S. tops with 10,000 watts or twentytwo times more than the average in the Third world. The standard of living of these countries compares somewhat to their respective consumption of energy.

The poorer countries of the world are therefore striving their utmost to increase their power production through Hydro-electric projects, Thermal Power stations and Atomic Power stations. All these need a very high capital investment for which these countries are borrowing from the richer nations on the basis that with increased production from this investment they will be able to pay back the loan. Unfortunately this big energy loan is getting difficult to return because the production of the poorer countries has to stand competition with that of the stronger and richer countries who are practicing protectionism against imports and thus the Third World poor are getting burdened with mounting debts which they are in no position to absolve themselves of. Still the trend of augmenting the Power Potential through foreign debts continues to attract the less industrialized nations, since they see no alternative path for improving their position.

If we go deep into the whole question of the world energy system and the competition on which it is based along with the petroleum crisis that continues unabated and will heat up as this limited resource of earth further depletes towards extinction, it becomes imperative that a new model of energy utilization is sought out. This could be something as follows.

The less industrialized countries instead of following the model of the highly Industrialized countries, in which game the latter will always beat them hollow, take to the production system which is : - (a) less energy intensive, (b) less capital intensive, (c) depends more on renewable

(Contd. on page 16)

from the labs

WEED VS. WEED

Dr. K. V. Krishnamurthy and R. Indira of the Bharathidasan University, Tiruchi, India, observed that water hyacinth does not co-exist with another water plant called ottalia alsimoides. It was found that water hyacinth exhibits positive antagonism and tries to drift away from ottelia. Experiments conducted subsequently established that the introduction of ottelia to water bodies infested with water hyacinth causes anatomical and morphological changes in the latter, leading to its destruction. The whole cycle of changes, degeneration and destruction takes place within three to four weeks. At the same time, it was also proved that ottelia is harmless to other water plants, aquatic animals and microbes. Also, Ottelia could be removed easily.

(Tech–Monitor, Nov.-Dec.1984)

NEEM NIPS CANCER

Regular brushing of teeth with Neem sticks (Azadirachta Indica) Prevents oral canaer.

Dr. David Barnese, chief of oral health programme of the world Health organisation, advocates regular use of Neem as a safeguard against mouth cancer.

According to an official report, the incidence of mouth cancer is the highest in India, from 35 to 40 per cent as against three to five per cent in North America and European countries.

Neem tree is a strong antiseptic and an effective germicide.

(UNI–April 8, Lucknow)

CART TYRES FILLED WITH SAWDUST

The FAO engineers have invented a new way of keeping in good working condition the cattle and donkey-drawn carts of the Kenyan farmers.

During a survey it was observed that the peasants did not like metal wheels, that used tyres had punctures too often and that new ones were too expensive.

The engineers have therefore solved the problem by using old tyres filled with sawdust : the risks of puncture are fewer and the carts run just as well. This cart is able to transport as much as 500 kilos at a speed of 15 kms. an hour.

(Ceresccpe, October 1984.)

PEDALLING FOR WATER

Four technologist from the Mahidol University, Bangkok, Thailand, have developed a low–cost bicycle-powered water pump meant for rural use.

The pump is a simple lift and force piston pump, capable of raising water to a height of more than 50 metres It consists of an ordinary lift and force pump, the rear part of a bicycle and an iron or wooden frame to mount both cycle and pump. Other materials used are PVC pipes of 25 and 35 mm diameter for connecting the pump to the source and for delivery, PVC unions for pipe connections, a foot valve for inlet to suction pump, a knotted nylon rope t act as driving belt, etc.

For installation, the rea portion of the bicycle is firs fastened to the frame usin additional metal supports. Th pump is mounted in position i the frame, behind the cyc wheel, and the driving be (knotted at eveay 150–200mm is fitted in place. Pedalling t bicycle in the ordinary way w cause the water to be raise from its source, through t PVC pipe connected to t pump.

(Tech–Monitor Nov.-Dec.19

Solar Disinfection of Drinking Water

--Actim Acra-Zeina Raffoul-Yester-Khrahagopian

The result of experiments
consistently confirmed the
that the bacteria contami-
ng water from faecal sour-
ıre, as a general rule, susc-
ble to destruction upon exp-
e to sunlight for an adequate
od of time. The rate of des-
tion actually depends upon
imber of influencing factors.
most important ones that
ame clear in the course of
study include the following :

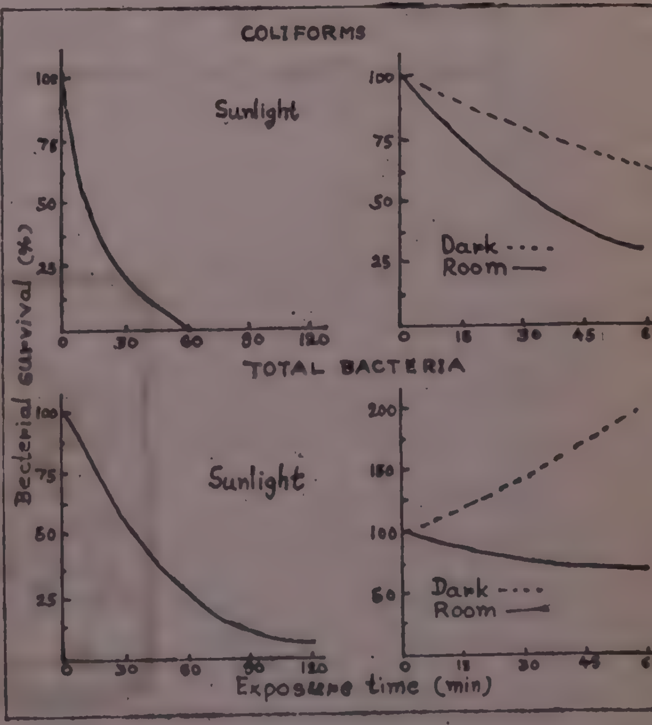
The progressive decline with
osure time in terms of the
entage of bacteria still sur-
ng followed an exponential
ine curve, a pattern typical
acterial destruction by che-
al disinfectants like chlorine
iodine. Figure given here
ws the exponential survial
ves for coliform bacteria
for the total bacterial popu-
on upon exposure of conta-
ated water in light blue
s jugs to sunlight, room con-
ons of lighting (a combina-
of artificial and natural
nination), and complete
kness. In this case the time
ired to kill 99.9% of coli-
n bacteria by sunlight was
ninutes, as compared to 6 30
utes under room conditions.
the total bacterial popula-
, a 99.9% level of destruct-
by sunlight was achieved in
minutes, and in 850 minutes
er room conditions. In com-
e darkness, the coliform
bacteria tend to die naturally at an extremely slow rate, but the total bacterial population tends to increase exponentially in the first 60 minutes followed by an erratic growth pattern.

Similar patterns were obtained when a variety of other containers were used. The time required to destroy 99.9% of the coliform bacteria by exposure to sunlight ranged from 70 minutes for colourless polyethylene bags to 1050 minutes for dark brown bottles. The corresponding mean value for all types of colourless glass or plastic conainers was found to be 85 minutes.

When unchlorinated batches of water inoculated with one type of enteric bacteria obtained from pure cultures were exposed to sunlight in 300 ml round Pyrex flasks, the time required for the complete destruction of each organism was found to be as follows : P. aerugenosa 15 minutes; S. flexneri 30 minutes; and S. typhi and S. enteritidis 60 minutes; E. coil 75 minutes; and S. paratypei B-90 minutes. Under similar conditions, coliform bacteria were destroyed in 80 minutes. These results indicate that, since coliform bacteria and E. coli are somewhat more resistant to the lethal effects of sunlight, they can serve as useful indicators in assessing the effect of sunlight on enteri, bacteria, except for S. paratyphi B.

All efforts to run experiments using water inoculated with V. cholepae were unsuccessful as judged from the lack of growth in containers subjected to sunlight, room conditions, and darkness. This unfortunate outcome could be due to a number of possiblities. the foremost being that the available pure culture itslef was not viable. Because of the great importance attached to cholera, particularly in endemic areas, it would be extremely useful to repeat these trials elsewhere. Of all the pathogenic intestinal bacteria, V. cholerae are among the most sensitive to environmental stresses, and this supports the suspicion that they too are subject to the lethal effect of sunlight.

As it was desirable to check on the possib ility of regrowth of the inactivated bacteria,



some experiments were designed to investigate this matter. The results obtained by storage for five days of disinfected water showed that inactivated coliform bacteria fail to regrow at ordinary room conditions. It is therefore assumed that already inactivated pathogenic bacteria would also fail to regrow. This would be of importance in relation to the need to store drinking water or ORS solutions without the fear of bacterial regrowth.

PROCEDURE :

1. Containers :

* From among those found at home, or purchased from the local market. select a number of containers made of colourless or blue tinted glass or transparent plastic estimated to hold an amount of drinking water sufficient for household consumption for one or two days.

2. Water :

* Fetch water in the usual manner from the common village supply (stream, well, pond, reservoir, etc.) If the water is highly turbid, then clarify the water by allowing the suspended particles to settle. Decant the clear water into other vessels.

* Carefully fill each of the containers hereafter reserved for the solar disinfection operation with the clarified water.

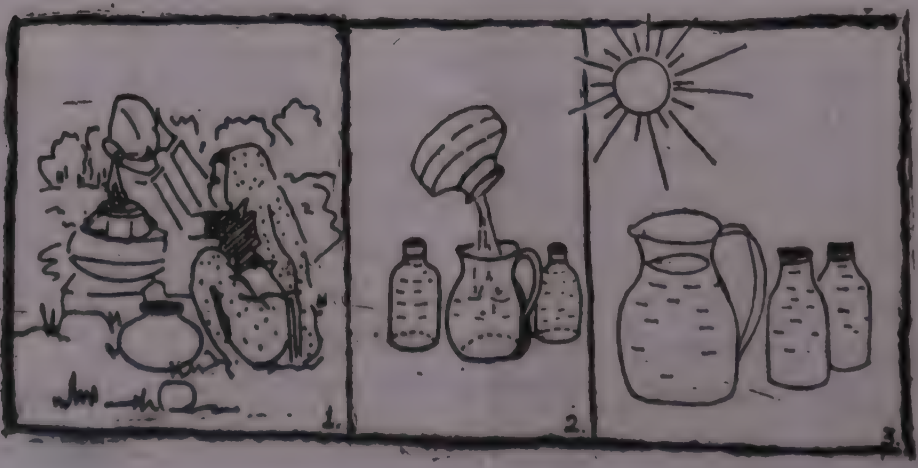
3 Exposure :

* Place the containers outdoors in an open space where sunlight cannot be obstructed by houses, walls, trees or bushes throughout the day. Porches, balconies roofs or window sills would be satisfactory if open land is not available. Select places away from dust, children, domestic animals, and pets to avoid contamination and mishief. Individual containers should be spread out to avoid shadows.

* Keep the containers in the
normal upright postions
Stoppers for bottles an
original covers for jars ma
be used to prevent th
entry of dust, dirt or vermi
But, such closures are no
essential for the disinfectio
process. In fact, water exp
osed to bright suulight i
tightly closed containe
could become much warme
than that in open containers

* Start the sunlight exposur
operation at a convenien
time in the morning and t
keep the containers expose
until the late afternoon. Th
exposed containers ma
then be kept in place ove
night to allow the water t
cool or they may be tran
ferred indoors in readines
for use.

(Abstracted from the publictio
'Solar disinfection of drinkin
water and oral rehydration solu
tions of UNICEF' of the exper
ments done at the Departmen
of Environment Health, Amer
can University of Beirut.)



SAFE LIMITS OF CHANGE

We live in a fascinating vorld. Our technologies are rapi-lly multiplying their uses around the world. They are con-stantly changing and making new demands on our instituti-ons. But at the same time, our human biology has remained unaltered ever since life began on earth So, in this age of soci-otechnical change, people every-where, whether living anywhere ace the common problem of daptation in new environme-nts, psychosocial factors cause various disorders.

Recently, a study was cond-ucted in the USA to examine ow rapidly ohanging life styles nd behaviour patterns of mericans today influence their hys'eal health and emotional vell being. It was discovered hat 50 per cent of the morta-ity from 70 leading causes of leath was from diseases caused y stress, obesity, anger, hopel-ssness and emotional unrest ausing from modern life style.

The most common is 'Sudden ardiac Death' (SCD) followed y hypertension and neurotic lness. SCD is common among eople in the age group (20-64 ears). It is unexpected death hat occurs within 24 hours.

There is considerable evid-nce that in many parts of the Third world, people are at least in some respects worse off than before the impact of industri-alization. The primary reason for this is that technological change usually leads to an inc-rease iu both population ano wants, while the resource base remains constant or even decli-nes. Hence for a society as a whole there is a move from self sufficiency to dependence on the outside. while individuals suffer at best relative depriva tion. The new needs imposed upon them becomes less and less capable of fulfilment. All this leads to frustration and stress.

In india, the problem of socio-technical change and its effect on health is complex. Here the pace of change is going to be quicker and more drama-tic and hence the impact on health and behaviour is likely to be more. Surveys report that around 30 to 60 per thousand of general population in India has symptoms of neurotic ill-ness. It is the result of helple-ssness and frustration when an individual connot cope with a powerful and threatening envir-onment. Again, the psychoso-cial diseases are found more in refugee population as compared to local residents Similarly, divorced persons in the year following divorce have an illness rate approximately 12 times more than married persons of similar age and situation. Women have been repeatedly found having higher incidence of depression. Many scientists have co-related this with the social role of women.

The new tecnnology qui-ckly raises high expectation which are only partly fulfilled for a small section of elite pop-ulation. Take the case of ordi-nary things like air-conditioner or a telephone, these facilities are known to everybody and hence the desire to possess them is strong. The first source of frustration is when the rich feel frustrated because there is not enough infrastructure to sustain high technology in a developing country. The quest of modern facilities induces some people to commit crime. We connot ignore the basic characteristics of human nature. Thus it is essential to ascertain as to how much socio-technica-cal change can be absorbed so that the flow of technology can be kept within the safe limits of human endurance and capacity.

– Savitri Sharma

JOJOBA–THE WONDER PLANT

A wonder oilseed plant which grows even in saline and desert lands. The liquid wax from its seeds has numerous uses.

The talismanic desert shrub Jojoba, **Simmondsia chinensis**, endemic to Sonoran Desert of Mexico, Arizona and California hitherto little known beyond its habitat has attracted the attention of scientists as a potential renewable source of substitute to sperm whale oil. The jojoba seed oil is as unique in the plant kingdom as the sperm whale oil in the animal kingdom. It stands out singularly distinct as the only non-triglyceride vegetable oil. It is not a fat but a liquid wax. The non-triglyceride esters of high molecular weight of the wax are entirely composed of straight chain unsaturated fatty acids (mono-ethylenic acids) and fatty alcohols (mono-ethylenic alcohols) of C_{20} and C_{22}. The oil is soluble in common organic solvents-as benzene, ether, chloroform, carbontetrachloride and carbon disulfide. It is insoluble in alcohol and acetone. This high viscosity index of 182, high flash and fire points of 338° c respectively, high dielectric constant of 2.68 and iodine value of 82 are the key properties for selective industrial uses.

THE USES

The manifold potential uses and industrial applications to which jojoba can be put to, are amazing. It is an ideal lubricant requiring no refinement for high speed, high temperature machinery, as a base for variety of cosmetics as hair oil, shampoo, soap, facecreams etc. It can be used as a coating for some pharmaceuticals, possible inhibitor to tubercle bacteria growth and as hair restorer. It has thecharcteristics of an ideal cooking oil of low calorific value. The variety of industrial applications of its alcoholic and acid derivatives includes preparation of disinfectants, detergents and corrosion inhibitors. The hydrogenated jojoba

wax can be utilised in polishing waxes a
of floors and automobiles and in the pr
paration of candles with long burning tim
The meal (deoiled cake) is a potential catt
feed suppliment after detoxification a
high nitrogen containing fertilizer.

THE PLANT

Jojoba is a natural woody dioecious eve
green, sturdy shrub of grey-green colour re
ching a height of seven feet and rarely
maximum of ten feet and exhibiting a gre
morphological heterogeneity. It is said to li
for 100–150 years. More than a century o
wild plantations occur in Gulf of Californi
Salton Sea Basin of Colorado Deserts, mou
tains around Tucson, Baja California a
coastal Sonora. It grows well in the areas
low rainfall (5–16 inches) and low soil fer
lity. Temperature may be critical factor
growing jojoba. Slight frosting below fre
zing point is pernicious to seedings and f
wers. An annual precipitation of 10-18 inch
with right temperature above 25°F is suit
for jojoba development. High temperatur
not exceeding 122°F (50°C) are said to ha
no adverse effects. It thrives well on mou
tain tops of 1080–5000 feet elevation, do
to sea level and in valleys and on variety
soil types from porous rocks to clays a
acidic to alkaline range. However, well ae
ted and well drained soils are the ideal su
trate for its growth. It can not grow on w
lands and marshy areas. The current dem

for large scale cultivation of jojoba springs from its utilisation as a natural resource for multifarious uses by the inhabitants of Sonoran Desert since times immemorial.

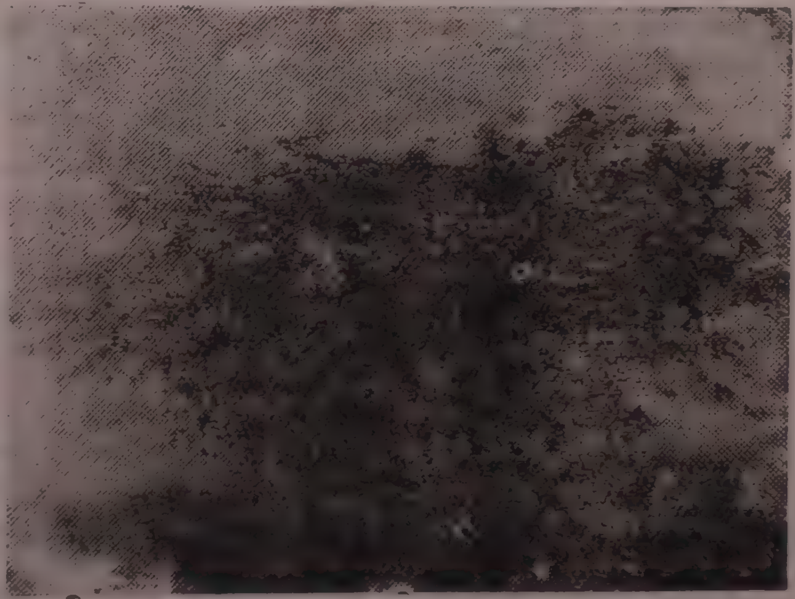
The versatile potentiality of this plant has zealously been recognized internationally and trial plantations have been envisaged on large scale in 15 countries of which Israel, Mexico, USA, Costa Rica, India and Australia are prominent.

Cultivation in India

Jojoba was first introduced into india in 1979-80 successfully on coastal dune sand under semi-arid conditions in Zanjmer village in Bhavnagar district of Gujarat State, in west coast and in the sub-humid region in Ganjam district of Orissa in east coast by Seawater Irriculture Discipline of Central Salt & Marine Chemicals Research Institute, Bhavnagar. Intensive investigations have been undertaken for domestication and to study various aspects of its successful performance on coastal dune sand. Nursery techniques are standardised and seedlings, raised in polythene bags, were transplanted on the dune sand and adequate irrigation was given. As the taproot penetrates a depth of 35 feet, more than 4 years old plantation does not require irrigation if annual rainfall is over 10 inches and well distributed. Flowering was observed during September–October after 14–16 months of sowing. Male flowers appear commonly earlier than females. In nature the male plants far out-number females, but the imbalance could be overcome by vegetative propagation of females. Pollination is by wind and the first fruit-set was observed after 18 month of sowing in January. Fruits of the first season were very few and remained unfilled, but during the succeeding season far larger number of fruits were observed. In the summer heat, the greyish brown fruit dries its skin and peels back exposing the wrinkled brown seed. The early fruiting within 21^1/2 years observed in India in sub-humid and semi-arid coastal climate as compared to 5–7 years duration, taken for fruiting in the native land of Sonoran Desert suggests that Indian sub-tropical coastal belt is better suited for jojoba growth. CSMCRI is acclaimed to be the only Institute to have successfully established and well organised cultivation of jojoba in India.

Potentials

Remarkably, the plant has been found to be salt tolerant too and saline water upto 10,000 ppm can be beneficially used as supplemental irrigation for the jojoba stands in water scarce coastal areas. Vegetative propagation through tissue culture has been successfully done in U. S. A. and Israel. Propagation by air–layering especially to increase female to male ratio has been attempted with success by the application of root producing hormones. In the bench scale process developed, the liquid wax present in the range of 45 to 66 percent by weight in seeds has been extracted using solvents. The sulfurization was also carried out for obtaining lubricating oil.



Following agencies are dealing with jojoba seeds :

1. **M/s. Jojoba Oil & Seeds Co. Inc.**
   20 East Southern Avenue, Mesa,
   Arizona 85202 (602) 833 4940.
2. **M /s. Nagev jojoba**
   C/o Delek, P. O. Box No. 1831,
   Tel. Aviv; Israel.
3. **National Bureau of plant Genetic resources**
   TARI Campus, New Delhi 110 012.

(Courtsey : Central Salt and Marine Chemicals Research Institute, Bhavnagar-364002.)

Use Of Red Clay Tiles For Making Mud Wall Non-Erodable

One of the serious problem with mud houses in rural areas is erosion of mud walls during the rains, this is very acute in black cotton soil areas like that in wardha. Apart from erosion the mud plaster also undergoes degradation due to cattle, rodent, bullock carts etc.

An effective tochnique to protect the mud walls from erosion and damage evolved by the Centre of Science for Villages (CSV) is the baked clay wall tiles. This technique consists of preparing 6"×6"×5 /8" burnt clay tiles, designed to fix. on the wall. The tile is embedded on a freshly plastered mud wall and is joined with cement mortar. Thus making an impermeable thin wall of tiles on the exposed surface of mud wall, which protects and supports mud wall from erosion and damage.

In 1983-84, after successful experimentation at Duttapur campus, we took the work of fabrication and demonstration of red (burnt) clay tiles to the villages. For this 50 villages around Wardha Block were chosen, in each village ten such houses were selected where poor people lived. In each house only one wall which faced the rains most was selected for tiling. Approximately 10'×5'–50 sq. ft. area was taken for fixing the tiles, i. e. wall to a height of 5 feet from the bottom. Out of the five hundered houses that were tiled 50% successfully stood two rainy seasons and the tiles are well intact safeguarding the mnd walls.In 50% the tiles gave away, the reason being defective workmanship.

On the basis of our field experience we have prepared this technical note which deals with the manufacture and fixing of red clay wall tiles in detail.

MANUFACTURE OF RED-CLAY TILES

I. Preparation of Clay :-

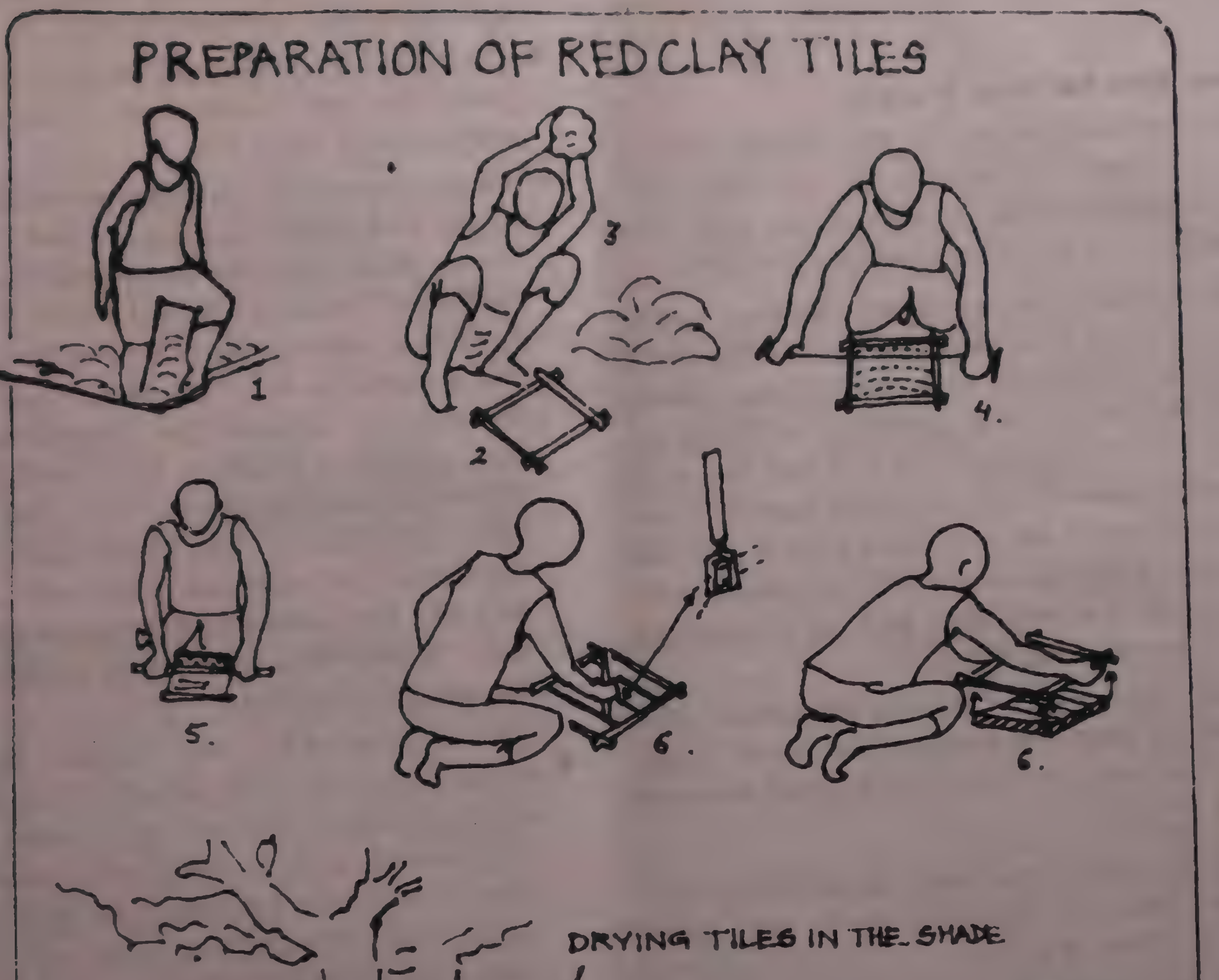
For the preparation of these tiles, clay available locally was used with some processing. Local clay (black cotton soil) was put in a pot and allowed for soaking for a over-night period and clay-slurry prepared by foot and hand mixing. This clay slurry was passed through a ten mesh metallic net and the sieved slurry was collected in settling tank. In this tank along with clay slurry grog (low burnt black cotton soil made into powder of required fineness) and ash was added as opening material and the mixed slurry was allowed to dry for required stiffness. This process took 3 day Then the clay was kneaded well with legs. (Fig 1)

II. Making of the tile:-

For the tile formation a metallic frame of 6½"×6½" and thickness 6/8" was used. (Fig 2.) This frame was placed over a plane surface, ashes or brick powder was sprinkled on it. Prepared clay was thrown and rammed in cavity of the metallic frame. (Fig 3) Excess clay above the level was removed by cutting with the help of an iron wire. (Fig4) The top surface was sprinkled with water and the finishing was done with a wooden strip. (Fig. 5) The metallic frame was removed and the tiles were allowed to dry for one day. Next day the same tile was taken and the edges were given proper finish. The bottom surface which was in contact with earth was also given horizontal cuts for grooves by using a bent knife. (Fig 6) Grooves made by finger have very weak hold, for deep and sharp grooves it is a must to use the groove blade (bent knife).

III. Drying and Baking of tiles:-

These tiles were collected one upon another (about 10 tiles) and a weight was placed over the tile to save the tile from warping Theses tiles were spread over out in the sun for a day for complete drying. They were loaded in an ordinary potters updraft kiln (Fig 7) and the firing was done to achieve the temperature of 880°C. Next day these tile


PREPARATION OF REDCLAY TILES
1
2
3
4.
5.
6.
6.
DRYING TILES IN THE SHADE
FIXING TILES ON MUDWALL
FIRING THE TILES
(INSIDE VIEW)
SEV. MAY 1985

were unloaded from the kiln and they were ready for use. These operations were got done in three villages by traditional potters and 1500-2000 tiles were fired per charges. The total tiles thus made being one lac (1,00,000 for 500 houses).

Fixing Tiles On Mud Walls :-

1. The old mud plaster or the outer coating of the mud wall was totally scrapped out showing the strong surface ef the wall, this surface was scratched and made rough.
2. For preparation of mud mortar good quality soil was taken and sieved. The mud mortar was mixed with 5% fibrous material like wheat, husk, straw etc. and kept for aging for 4-5 days (Fig 8). Then the mud mortar was mixed well and applied over the surface of the wall to at least 2''-3'' thickness while plastering the deformation on the walls was corrected making is straight and smooth (Fig 9).
3. While applying the mortar precaution was taken to maintain a slope of 5'' to 6'' from the bottom to the top level of the wall (Fig 10).
4. Only the strong and well shaped clay tilels were selected, rejecting half burnt and cracked tiles (Fig 11).
5. The clay tiles were pressed well on the walls coated with mud mortar with the grooved side embedded in the mud mortar. The mortar which came out between the two tiles were removed with trowel and the gap filled with cement mortar (Fig. 12) (1 portion cement : 4 portion sand). The cement pointing is cured for 4-5 days. (As the required quantity of cement is less, its quality should be good; the sand should be seived as fine sand is preferable to coarse one.)

Fixing of the tiles :-

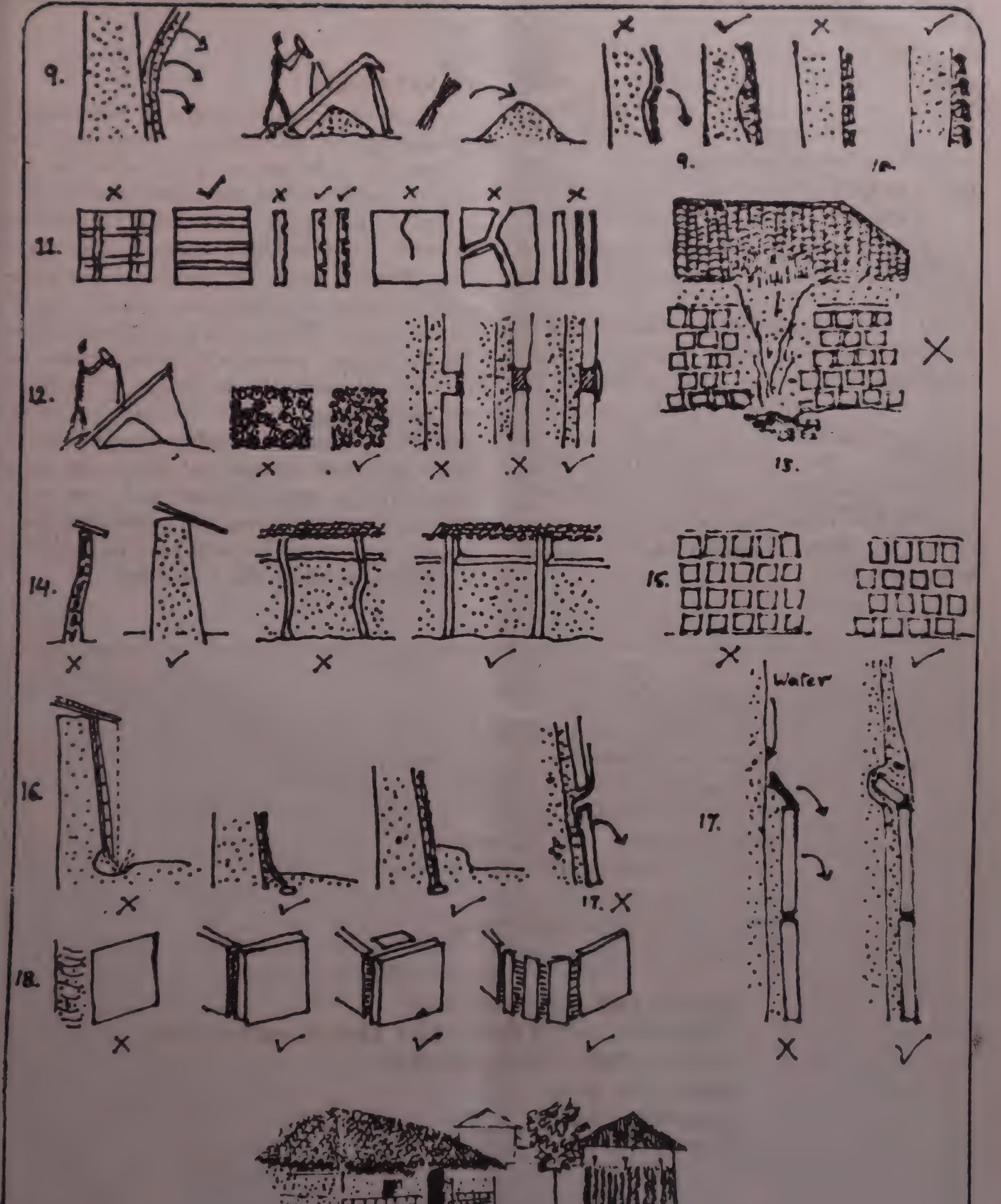
While fixing tiles points to remember.

1. The roof above the wall where tiles have to be fixed must not leak and over hang should be sufficient. (Fig. 13).
2. the tiles can be successfully applied on walls which are stable, that is to say on thick cob walls or on wattle & daub walls whose farme is strong and well fixed. At least 6'' wall thickness is required. (Fig. 14).
3. Each row of tiles should be slightly shifted from the row below, so as to procure a strong bond. (Fig. 15).
4. During monsoon, flowing water-from the walls and from the streets-and dropping water from the roof attack the base of the walls and removes the soil which is around it. Water sinks in the wall and the range of tile is prone to fall. Therefore soil should be dug up around the basement of the wall and tiles fixed a little underground. If stones are available, they should put under the tiles at the base and the last tile should be covered with soil. A small step like base all around the house plastered with "gobri" is a very good protection to the plinth. (Fig. 16).
5. The last row of top tiles should smoothly merge into the wall above it. For this the wall, just above the last row of tiles, should be grooved and a joint of cement or a row of half tiles be fixed in the wall at angle, thus joining the edge of the top tiles with the wall. After the tiles are fixed, the wall abcve the tiled surface should be replastered with mud mortar to a thickness that the tiles and mud wall come to the same level, forming an even surface with no slope or grove. (Fig. 17).

5. The corner of the house is the point which is getting the hardest mechnical impacts (of animals, bullock carts...) (Fig. 18). Special care is to be taken for the corner joints. Either tiles have to be cut in two pieces and a round corner should be made or tiles should be so joined so that they make a perfect and strong right angle. Burnt bricks can be used for reinforcing it.

COST OF APPLICATION :

The cost of production of tiles is 20 paise per tile, cost of tiles per square feet-Rs. 0 80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Water

SFV. MAY 1985.

and the fixing expenditure per square feet including materials and labour–Rs. 0.90. Thus the total rates of tiles fixing came to Rs. 1.70 per spuare feet which includes labour cost, if the house owner does all the work himself the cost is Rs. 1.00 per square feet. The expected life of the tiled wall is 5 to 10 years depending on its maintenance.

PLUS POINT :

In 85% of the houses in the villages specially women gave the following reasons for their preference to the wall treatment with tiles :

(I) Usually they had to protect the wall with a matting made from 'tuar' plant stems or leaves of palmyra trees which have to be made, every year. Palmyra leaves are getting scarer and one has to go long distances to collect them. Making of 'tuar" mat is tedious. This is now avoided, saving time and labour.

(II) The outer side of the wall looks asthetically better and much like the pukka wall and at the same time has insulation property of a mud wall. It required quite less maintenace than other traditional protection.

CONCLUSION :

In general this technique is appreciated by the villages and can be replicable elsewhere. The technique of preparation of tile is very simple so that the village potter can adopt the technique after some preliminary training. Even unskilled potters can make the tiles. The raw materials used for the preparation is locally available and simple equipment is used. This can be an additional item for the village potter which can increase his earnings. However the technique will require to be propagated and incentives provided for it to be able to catch up–specially in areas of black cotton soil where tbe poor who live in mud houses and are economically weak to invest in improving their houses, some subsidies will have to be given to help them adopt this techuique.

"Virtuosity
in any sphere–whether in the Arts or
the Sciences–depends upon the creative
freedom allowed to the individual. For
freedom allows latent talent to express,
ifself–to explore new dimensions of
thought and action, unfettered by the
conventionality–to give
shape to innovations that change
the quality of life."

–An Excel Belief

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NEWS & VIEWS

USING WATERWAYS FOR TRANSPORT

China alone has more than 100,000 km of navigable channels. Using these waterways for transport requires initial spending on vessels, handling facilities, and maintenance, but the costs amount to only a tenth of the investment needed to build a similar length of roadway. What is more, water-borne vessels consume less than a fifth of the energy needed to fuel road transport over similar distances and can deliver much larger cargoes (up to 6000 metric tons at a time) much more economically.

The Indian Government is rapidly improving its internal waterways, which now amount to 14,500 km in length. It's plans include the declaration of National waterway No. 1, the Ganges from Haldia to Allahabad. Investmant in waterways has sharply increased since 1980, and Indian shipyards have added three pushers, a dozen self-propelled barges, and 25 push-barges to the nation's inland fleet in the past two years.

In Pakistan, the Indus River will be able to carry 25 percent of the nation's cargo when a development plan aimed at making river navigable and connecting it to sea ports is completed.

WORLD'S EVERY 4TH MAN WITHOUT SHELTER

One quarter of world's population do not have adequate housing of which 100 million have no roof over their heads at all. In the cities of the developing world, 50 per cent of the inhabitants live in slums or sqatter settlements.

These shocking facts about the shelterless have been brought out in papers to be read at the national seminar on the projects for the International Year of Shelter for the Homeless (IYSH)-1987.

The aim of IYSH is to provide shelter to all the shelterless people of the world by the year 2000, by then every second person in developing countries would be in the cities creating an astronomical demand for urban housing.

In India about 6·8 million landless families in rural areas were estimated to be in need of house sites during the Sixth plan. But even the 7.7 million families which had house sites needed assistance to construct the houses or improve the existing house, by the Seventh plan an additional 17 million housing units would have to be constructed.

As part of the IYSH-87 a national focal point is to be created which would disseminate information on shelter policies and oaganisations engaged in it. The Apex Committee is set up to identify action areas and draw np programmes,

SELF-EMPLOYED RURAL ENTERPRISES

Rural enterprises still constitute the bulk of the 18.41 million enterprises in the country employing nearly 54 million workers.

According to the economic census 1980, of the total enterprises 92 per cent were engaged in non-agricultural activities and the rest in agricultural.

Establishments constituted 27 per cent of the total enterprises; own-account enterprises which were owned and operated with the help of household labour only, accounted for the rest 73 per cent. About 84 per cent of the agricultural enterprises and 72 per cent of the non-agricultural enterprises were own-account enterprises and the remaining were establishments.

The share of rural areas in respect of employment in agricultural enterprises was 86 per cent. Number of persons working in non-agricultural enterprises was 50.70 million constituting 95 per cent of the total. Among those working in non-agricultural enterprises, 21.95 million were in rural areas of which 44 per cent were hired labour.

ENERGY NEWS

RENEWABLE ENERGY RESEARCH

South Asian Regional Co-operation (SARC) has decided to set up a network of centres for research in solar energy and biogas in the region. India has suggested assistance from the European Economic Community (EEC) in rural technology.

COCONUT AREAS OF INDIA MAY TURN INTO OILFIELDS

If the research currently being done on turning seed oil into diesel fuel succeeds, vast area of India where coconut oil is produced in abudance may turn into new kind of oil fields. Nobel prize winner Malvin Calvin told an international chemical congress of Pacific Basic Societies held in Honolulu recently, that there was a way of splitting seed oil extracted from coconut palm or sunflower, to produce a nomomethylester that can be used as diesel fuel.

He said all that the farmer had to do was to let methanol and the seed oil sit for a while with a catalyst. The seed oil will automatically split into glycerine and diesel fuel. While glycerine can be sold separately, the catalyst which is a solid acid can be used again and again.

In laboratory conditions, conducted on small scales, it took only a few hours for the oil to split, on a larger scale in the fields, it may take days or even weeks for the process to complete.

THE ENERGY GROUP IN M. P.

Madhya Pradesh Urja Vikas Nigam Ltd. was established in 1982 to promote, investigate, establish, maintain and manage installations utilising non-conventional and renewable sources of energy.

Water heaters: In just over one year the corporation has completed 27 projects costing Rs. 75 lakhs. It has installed a heating system heating 30,000 litres of water per day at 60° c at Bhopal Dairy and another 24000 litres per day at 85°c for boiler feed. Solar dryer is installed for drying 50 kg. of wool per day at the kambal kendra of KVIB (Khadi & village Industries Board) and one tonne per hour paddy dryer at Nutan Rice Mills, Raipur.

Solar stills: With a collector area of one sq. metre each generating abut 3 to 4 litres of distilled water are supplied to all central schools (41) in M. P. and also to public health and engineering departments of M. P. Government. **Solar Kilns**- one solar kiln has been established at Narmada-wood products at Itarsi which is under the control of the MP Fore Development Corporation. **Sola Refrigerator** of 5000 litre pe day has been installed at Cha pda in Dewas district. Sola Photovoltaic Cells are used fe lighting villages and pumpin water. Three public lighting sys tems and three pumping wate system are commissioned in th state. It is proposed to insta one such system in far-flun villages of all districts (MP).

Solar Coookers–The Corp ration has sold about 400 sola cookers and expects to se about 3000 more by the end c this year 1985.

Bio-gas- The corporatio has plans to put up biogas pla nts based on distillary effluent at all the distillaries in MP. Th bio-gas plants are available i three sizes in prices rangin between Rs. 4,500 to Rs. 7,20 **Wind energy**- About 170 win mills have been installed in th state for pumping water. Th Corporation has installed 5 K gasifier cum generator in it office premises. It has installe 25 hydraulic rams.

Smokeless Chulha

VII th Plan targets of smokeess chulhas is 50 lacs. It is estimated to save 42 lac tonnes of fuelwood costing Rs. 294 crore.

hy Vegetarian Diet ?

Provided they eat enough of it, people ho live on traditional cereal and legume ets receive sufficient protein. Although eat products may deliver plenty of amino ids, vegetables too can be combined to give ideal diet.

During the past decades, for example, angelists of a "Western" way of life have, good faith, helped spread a false gospel to e rest of the world. This included a belief at only a diet based on meat and animal oducts could ensure health and growth.

The common European diet makes bread e "stuff of life" accompanied by meat, gs, milk and locally available vegetables d fruits. With the rise of nutritional scie- e, such a diet came to be accepted every- here in the world as the "ideal" one. Today's tritionists everywhere in the world feel at the European diet is too high in total ergy, too high in protein, too high in fat, high in refined sugar, too low in fibres d probably too high in salt.

Because of its emphasis on food of animal gins, such a diet places the heaviest strain the world's limited food supplies and reso- ces. Food that could nourish human beings given to animals, and it usually takes seven nes as much food to produce the same nount of energy by passing it through an imal first than it would be consumed dire- y. Dr. moises Behar, Chief of the Nutrition it at WHO headquarters in Geneva, says : he European diet not only is not the best t from the health point of view, but it is solutely impractieal in economic terms for world population under present cricum- nces".

points to ponder

Traditional diets in the Third World are based mainly on cereals and legumes, with a small amount of food of animal origin. Now though meat products can deliver a high concentration of essential amino acids, vegetables can be combined to provide an excellent balance. Corn and beans, rice and beans, wheat with green peas or lentils can provide enough proteins to satisfy human needs when eaten in adequate proportions and amounts.

With few exceptions, where people in traditional cultures eat enough they are well fed. Furthermore, merely ensuring more food production does nothing to reduce malnutrition if the poor can't buy it or if the food doesn't reach them.

(Abstract from editorial of Home Science July 84)

CORRECTION.

NON ERODABLE MUD PLASTER

Feb. 85 issue of SFV on page 8 gave techniques on non-erodable mud plaster for mud Walls. The estimate of cost of the technique given there in was Rs. 1.00–1.50 per sq. metre. This was an old figure, the estimate for November 83 from C B R I Roorkee is Rs. 4 per sq: metre and CSV Wardha's estimate in 1985 comes to Rs. 6.50 per sq. metre wich self labour. In case of hired labour the amount comes to Rs. 5.50 per sq. metre (CBRI figure) and Rs. 9.40 (CSV figure)– Editor.

(...Contd. From Page 1)

resources, (d) caters more for the local market and is not greatly obliged to earn foreign exchange to pay back loans or purchase of goods, (e) planned in a way to build up ecological balances, and not allow pollution of environment and imbalances in Nature's delicately balanced cycles, (f) as far decentralized as possible according to the products required, (g) leading to distribution of wealth equitably both regionwise, as well as amongst the people.

The traditional western model may bring high production at heavy investment cost but will not only be off the mark of 'socialism' as defined above but lead to many more prooblem than it seeks to solve. What we need is a new path of technology.

Devendra Kumar

CSV AT WORK

Ball-Bearing & Soak-Pit installation project :

Beside collection of fuel and cooking, fetching of water has a major share in the drudgery of rural women. Far reducing their drudgery in water fetching, pulley were specially designed and were fitted with ball-bearing device to reduce the friction which ultimately reduces the fetching strain. Under this project about 250 such pullies have been fixed on the public wells in 60 villages in Wardha block of Wardha District. In order to improve the villages sanitation about 50 soak pits were instatlled on the public walls in each of the 50 villages of this block. Both the devices were highly appreciated by th women who were also mad aware of the tachniques an about their repair and mainte nance by arranging specia women Awarness Camps. On of the major highlights of th project is the trainiug of 1 rural youth selected from th villages covered under tho pr ject. They were trained in th basics of the techniques and th actual installation was done b them. It is hoped that as th devices will become popular i the villages, these youth wi find self-employment in ll village by catering to the villag demand for Ball Bearing pulle & soak Pits.

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TECHNOLOGY

Book Post /Printed Matter

23. EDITOR
CFTRI NEWS LETTER
CENTRAL FOOD TECHNOLOGICA
RESEARCH INSTITUTE
MYSORE - 570013
KARNATAKA

Pubished by : Devendra Kumar on behalf of Science for Villages, Wardha, Editor : Devendra Kumar
Managing Editor : Rajiv Gupta :
Editorial Office : Centre of Science for viliages Magan Sangrahalaya, Wardha 442001, Maharashtra, a
Printed at : Subhash Printing Press Ramnagar, Wardha 442001.

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SCIENCE FOR VILLAGES

Building a Bridge beetween the Science Lab and the Village Mudhut

. 93 June 1985, Monthly, Annual Subscription : Rs.15/-(10 Dollars) Individual and Rs.25/-(15 Dollars) Instituti

Why & How of Village Happiness

Jerome Gue, a French youngman who, after his engineering training in Paris opted to work in India, was with us for one-and-a-half-years and only last week left for home. He learnt Hindi, was quite fluent in it, and spent most of his time in villages. He learnt from artisans many things and taught them many things. Low cost village housing, specially mud houses, was his subject and he made good contribution towards the same. But what is more important is the spirit which he imbibed. In his farewell speech (of course in Hindi), he said that he was fortunate that he could see real India (or Bharat as he called it to differentiate from urban India) which lives in the villages, where the amenities of life are at an abysmally low level.

As per European way of thinking the life here, he thought, should be very dry, drab and sickening. He, however, found things different. From his village experiences he felt that the basic human needs of food, cloth and shelter must be fulfiled and other necessary amenities also made available to the people but there seems to be no direct relationship between the multiplicity of wants and the zest for life, the people enjoy. His discovery was that despite the difficulties of living, the village people had great convivility and expressed themselves through their laborious activities in joyfulness disproportionate to the amenities they possessed. This looks strange to the Western materialistic thought which says that the more possesions you have the more happy your life becomes and vice versa. Our villages have better natural surroundings than cities. The Sun, rain, trees and animals are closer to the villagers and so also are the people closer to each other. His conclusion was that if basic necessities could be assured to the people there – for which assurance is not there today–human beings would be happier under the rural than in urban circumstances. This looks quite valid.

Now does it mean that we leave the villages as they are by only improving their needs of water, sanitation, road electricity, communications, housing, school, hospital and entertainment etc. or does the new technology have to change the economy of the people too. The present economy of the villages is such that on the whole the degree of development is very slow. The village produces raw materials and imports finished goods. The gap between the per capita income of the urban and rural populations goes on increasing and this leads to constant erosion of the talents from the village and part of the male population's exodus to urban slums. To stop this, it is necessay that the village economy is made more remunerative by having such industries added to agriculture which lead to production of finished goods bringing a greater employment potential there. Efforts of rural technology and industry should lead towards the fulfilment of a dream where man happily lives a life of sharing with Nature and fellow human beings in a way that develops the individual, the community and natural environment to their full potential.

Devendra Kumar

from the labs

Bicycle Energy

The ubiquitous bicycle, the poor man's transport may well turn out to be the solution to future energy needs of the rural areas in the country. The rural appropriate technology centre of the Tamil Nadu Christian Council Economic Life Committee, Guindy, Madras has made innovative use of the cycle for efficient extraction of human energy available in plenty in villages.

According to a paper presented by the centre's director Mr Mithra J. Ebenezer at a seminar on "rural energy futures- perspectives for policy alternatives," a special bolt-on attachement converts the cycle instantly into a prime mover to run a variety of small agricultural and industrial machines. A stand-cum-carrier could also be used for transporting farm and other produce when the cycle is not in use as prime mover.

The centre had also designed and fabricated a portable pedal collapsible device for easy movement in hilly terrain where the cycle is not normally the mode of transport. (The Hindustan Times).

Brick-making machine developed

The Central Building Research Institute (CBRI), Roorkee has developed a brick-making machine which is expected to help meet the huge demand for bricks in the construction industry.

The manchine can produce 2500 bricks per hour and can also fabricate other forms of structural clay units used for roofing and flooring purposes.

The CBRI scientists have also developed an automatic "real type cutter" and a brick kiln for use in conjunction with the brick-making machine.

Magic Milk Booster

The National Dairy Research Institute at Karnal has found a simple and effective way to increase milk production in the country. Spray the buffaloes with water before milking and the milk yield goes up.

On the basis of research trials NDRI has concluded that if the buffaloes are sprayed with water twice before milking during the summer months,. the milk yield increaser by about 0.75 litre per cattle on an average. (Indian Express)

Alcohol From Tapioca.

A pilot project undertaken by the Central Tuber Crops Research Institute (CTCRI) at Sreekaryam, has perfected a technology to produce industrial alcohol for energy from cassava (tapioca).

Dr. S. P. Ghosh, Director, CTCRI told newsmen that results have indicated the possibility of producing 400 to 420 litres of alcohol from one tonne of cassava flour.

The institute has identified three short-duration cassava geno types which can be harvested in about six to seven months. These will be released to the farmers in two months time after multi-location trials, he added.

The five hybrids of cassava earlier released by the institute required 10 months for maturity and harvest.

The three short duration genotypes have now been developed are capable of producing 25 to 30 tonnes of tapioca per hectare as revealed in field trials conducted after seven months of planting in rainfed conditions.

Waste into Wealth

The National Building Organization has brought out a Directory of Industrial and Agricultural Wastes giving information on their conversion into building material and use in low cost construction. The Directory covers 24 major industrial and eight agricultural wastes. These include industrial wastes such as flyash, blast furnace slag, by-product gypsum and agricultural wastes like rice-husk, straws, coconut fibres, bagasse and saw-mill waste.

(World Science News)

Ayurvedic Cure For Cancer

A 'potent' and non-toxic' anti-cancer drug has been developed from a common hedge plant by Captain Srinivasamurti, Drug Research Institute of Ayurveda, Madras.

The drug isolated from the plant 'solamun trilobatum' (thuduvalai) has been found affective in the treatment of osteogenic (bone-related) sarcoma and cancers of the lips, cervix and cheek.

(The Hindustan Times)

The One Straw Revolution

Masanobu Fukuoka received training in microbiology specializing in plant diseases and then worked for some years as an agricultural customs inspector. Then, while still a young man of 25, Mr. Fukuoka began to question the fundamental principles of modern farming He decided to leave his technical career and returned instead to his village home where, over the next 35 years, he worked to develop a unique method of natural farming. Today he has a large following in Japan He lectures widely, has written many articles and books, and spends much of his time sharing his philosophy and farming techniques with the many visitors who come to his farm overlooking Matsuyama Bay on the island of Shikoku in southern Japan. The follwnig is from a review of his book. 'The one Straw Revolution' by Claud Alvaris.

Fukuoka calls his method "do nothing" farming. Most of the work in his fields is done by natural processes, and nature is the most experienced farmer among us all. Forests are, for example, nature's own pristine form of agriculture : All trees grow in symbiosis, there is no pollution, there are no pests, yet surplus is available. The fertility of the soil is maintained without outside intervention, purely through the natural processes of production and decay.

Forest method of Agriculture

What this Japanese scientist has succeeded in doing is replicating the forest environment in his land. Not only does he grow rice without tillage, he uses no water to flood the fields permanently. A few days before the rice in harvested, he sows winter grain like rye and barley in the standing crop. The rice is harvested and the straw spread over the sprouted winter grain. The same procedure is followed before the monsoon: Rice is broadcast within the standing winter grain, and allowed to germinate and the winter straw is then spread over it.

Fukuoka has refined the system to a stage where only a few workers now broadcast the seed once and for all. In the standing rice crop in October, he broadcasts rice and clover for the crop that will be harvested the following year. He also simultaneously plants winter grain. The winter seed sprouts first, the clover later the rice thereafter in smooth progression.

Of course, since there is such a thick layer of mulch built on the soil, and the soil structure is maintained intact through no-tillage there is no need for either pesticides or chemical fertilisers, nor even prepared compost. In some ways, the melthod of no till is akin to swidden(slash-and-burn) agriculture, where the seed is planted in unploughed land with the aid of a hoe. In other words, Fukuoka throws modern agriculture in its entirety out of the window, and refines older farming techniquas to reduce the labour in farming.

The problem with modern agricultural research, he says, is that it seeks to work at cross-purposes, rather than in cooperation, with nature. Modern agricultural research, or green revolution technology, seems inevitable today because "the natural balance has been so upset beforehand by those same techniques that the land has become dependent on them."

We break then mend

He says "Human being with their tampering do something wrong, leave the damage unrepaired, and when the adverse result accumulate, work with all their might to correct them. When the corrective actions appear to be successful, they come to view these measures as splendid accomplishments, People do this over and over again. It is as if a fool were to stamp on and break the tiles of his roof. Then when it starts to rain and the ceiling begins to rot away, he hastily climbs up to mend the damage, rejoicing in the end that he has accomplished a miraculouss olution. "It is the same with the scientist. He pours over books night and day, straining his eyes and becoming nearsighted, and if you wonder what on earth he has been working on all that time it is to become the inventor of eyeglasses to correct nearsightedness."

In Fukuoka's imagery, modern agriculture operates in an environment more suited to a hospital. The so-called high yielding varieties of seeds cannot operate without the aid of intensive care units (ICUs) composed of ample supplies of water, expensive chemicals, pesticides and huge machines (since maturing of crops over large areas takes place simultaneously). Because the seeds are weak it becomes necessary for the farmer to apply chemical and insecticides 8 to 10 times during the growing season. "In a short time the soil is destroyed and crops come to be dependent on nutrients added from the outside in the form of chemical fertiliser. "It appears that things go better when the farmer applies 'scientific' techniques, but this does not mean that science must come to the rescue because the natural fertility is inherently insufficient. It means that rescue is necessary because the natural fertility has been destroyed."

Agriculture of permanence

The fertility of the earth, says Fukuoka, is beyond the reach of our imagination. If one visits any wild mountainside, one can see giant trees that grow without fertiliser and without cultivation. One has to discover the fixed point of an agriculture of permanence and this must be achieved independent of current debates, fantasies or theories. I believe that even returning to nature and anti-pollution activities, no matter how commendable are not moving towards a genuine solution if they are carried out solely in reaction to the over-development of the present age."

Fukuoka is mystified that modern agriculture on his neighbours' fieds requires so much labour, investment and year-round activity. With the green revolution, farmers are working more, sweating more, to get marginal increases. Earlier, they at least had time "to write a poem or compose a song," today they must continuously weed and spray pesticides, activities demanded by a disturbed ecology. Ever new forms of dependence are created as governments take over the function of distributing new seeds and multinational corporations become the sources of fertility.

Towards the close of his remarkable book, Fukuoka asks a simple and innocuous question that must modern agriculture, with its huge paraphernalia of microbiologists, entomologists, bacteriologists, agricultural chemists, statisticians, international agricultural institutes chemical fertilisers, spraying machines, germicides, pesticides fungicides, etc. etc. He asks: "I have demonstrated in my fields that natural farming produces harvests comparable to those of modern Scientific agriculture. If the results of a nonactive agriculture are comparable to those of science, at a fraction of the investment in labour and resources, then where is the benefit of scientific technology ?"

(The book is available in India from Friends Rural Centre, Rasulia, Hoshangabad. M. P.–Rs. 30)

"Virtuosity
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the Sciences–depends upon the creative
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Ganga-Pure Yet Pulluted

—Dr. N. C. GHOSE

Is the Ganga, the holiest river of India, really blessed with curative powers as it is commonly claimed to be ? It is endowed with a quality which makes the water pure even after vast quantities of pollutents are discharged into it ?

To an extent the answer seems to be 'yes'. Dr. N. G. Ghose reader in the department of geology in Patna University, who has been spearheading a campaign to get the river cleaned, says the strong presence of radon, a radium derivative may be the reason for this.

The concentration of radon which may give the water germicidal qualities-is the highest in the Ganga in comparison with all the other rivers in the country.

Quoting figures released by the Uranium Corporation of India, at Jaduguda in Bihar, Dr. Ghose says the radon content in the Ganga is 86.5 pci per litre against 65.5 in the Damodar and the Swarnalekha and 76.5 in the Gandak.

Dr. Ghose, in his analysis, has also found that the iodine content in the Ganga is ideal and within the "exact level" recommended by the World Health Organisation. While the iodine value of the Gandak is 3.5 mg per litre. the Ganga has 7.5 mg (in north Bihar, where the Ganga doesn't flow, goitre, caused by lack of iodin intake, is commonplace.)

The misfortune of the Ganga is not only that all kinds of wastes city sewage, industrial effluents, faeces and dead bodies-are thrown in but also that it passes through three of the most ill-managed States in the country. The water pollution control boards, of Uttar Pradesh, Bihar and West Bengal have played such a miniscule role in fighting the pollution menace that unless a thorough overhaul is ordered, the problem will continue to dog, the region despite all the funds provided by the Centre.

The voluntary organisations which have been fighting for a cleaner river over the years feel that the newly announced programme for a Ganga Development Aurhority has not come a day sooner. "The problem is so expensive that I am glad that some one in the Government has finally taken note of it," says Prof. V. B. Mishra of the Swachch Ganga campaign at Varanasi.

The Plan

The Rs. 250-crose project of the Central Government envisages the renovation and recommissioning of the existing sewage treatment plants and installation of new ones as a major step towards pollution control.

A report entitled "Prevention of Pollution of the Ganga prepared by the Department of Environment in 1984, says that the main bv-products of the process will be methane biogas, algae and fish. Its estimated that on an average it should be possible to get an annual income of Rs. 37 per capita contribution of swage by the sale of these by-products and against that the expenditure of pumping and treating sewage would by the sale of these by-products and against that the expenditure of pumping and treatlng sewage would be Rs. 28 per capita per year the report says.

The plan to be carried out from 1985 to 1990, will be over seen by an apex body at the Centre. But the most disturbing piece of news is that the, "preparation of detailed projects, execution, operation and maintenance of these works after completion may be entrusted to the concerned State boards for the prevention and control of water pollution or other appropriate agencies."

If the Central Government is really serious about cleaning up the Ganna, one thing it should not do is to hand over the task to the State bodies. The water pollution boards, as they exist today are mainly staffed with callous top brass and indifferent subordinates.

The Ganga is only one of the hundreds of polluted rivers and rivulets that crisi-cross the country and tackling its pollution is just the beginning of a tremendous task that lies ahead. Information available with the NEERI says *If the entire sewage generated in India is put to proper use, it could irrigate two lakh hectares of land. The total sewage generated per day is estimated at 250 to 300 million gallons.*

The solid wastes of 15 million tonnes can give out 40,000 tonnes of nitrogen, 20,009 tonnes of potassium and 25,000 tonnes of phosphates By NEERI's calculations, the conversion would cost Rs. 80 crore.

(Abstracted from the authors article entitled 'Polluted Ganga Still Gifted with Curative Powers'.)

* *

Toilets For Everyone

India is one of the countries which has the biggest sanitation programme in the South Asia region. Over 630 million people have no access to adequate sanitation. Most live in rural areas, but it is in the overcrowded urban areas where the problem is most obvious. Many people have no option but to defecate on any patch of open ground, or even in the streets : the sanitation problems of the country have not been solved satisfactorilyby many government institutions and centres all over the country. Here are two successful examples of NGO efforts :

Efforts made by Patel

Ishwarbhai Patel, who is known among the population as "Mr. Toilet," has for the past 30 years, strived to abolish the inhuman practice of carrying bucket latrine nightsoil as a head load, which is a job reserved solely for the sweepers and scavengers among the untouchable class-the most down-caste of Indian society. Patel is the head of the famous Safai Vidyalaya (Sanitation Institute) of Gujarat.

The Safai Vidyalaya was established in 1963 with financial support from Harijan Sevak Sangh. Since then Patel and his team began working on new latrine designs and set up training programs.

In Gujarat, Safai Vidyalaya's work, with state backing, has resulted in about 160,000 bucket latrines being converted into private water-seal pour-flush latrines. Every year there are about 6-7,000 new conversions. The average cost of each latrine is about Rs. 650 (USD 62) of which 50% is provided by the house-holder, 25% from the municipalities and 25% as a government grant. At present, the Safai Vidyalaya is working closely with the UNDP World Global Project which is installing low-cost latrines in 15 Gujarati towns. It is constantly extending its work to other states in India and is very much involved with the Tamil Nadu and Kerala low-cost sanitation programs.

Sulabh Shauchalayas

The Sulabh Shauchalayas (in Hindi meaning easy-to-use) is improved version of the standard hand-flushed latrine first installed in Patna by a non-governmental organisation called Sulabh International. There are now over 70,000 in Bihar state with nearly 10,000 in the city of patna alone. The Sulabh has now spread its activities to several parts of India as well as neighboring countries like Bangladesh, Nepal and Sri Lanka. Sanitation specialists from as far as Latin America have come to train at Sulabh's facilities.

Sulabh's communal latrines have been built on land donated by municipalities. The maintenance cost is covered by collecting a fee of 10 paise (one US cent) from those who can afford it, and most users pay. Women and children are allowed to use the facility free of charge. At one such center in patna, over 3,000 people use the facilities daily and yet operations are smooth and efficient. According to the chairman of Sulbah international, there is no pushing or shouting even during the rush hour, from 5.00 a. m. to 7.00 a. m., when there is a line of 5 to 10 persons outside of each cubicle. The total cost of the Sulabh letrines is about Rs. 1,000 (USS 100), not including the cost of the superstructure. The respective state governments subsidize half the cost, and convert the remaining sum into a loan payable in easy instalments. Sulabh finances itself by charging 10 percent of the total cost as its fee.

The agency has also launched a plan to train people to make and install sulabh toilets. It actively helps householders with the necessary formalities for getting loans from the local authorities to convert bucket into water-seal latrines, and then installs them. The Sulabh International gives a guarantee of two years and looks after the maintenance when needed. However, a serious constraint to Sulabh's programes has been the lack of complimentary research. For instance, the risk of contaminating groundwater supplies by bacterial contamination from the pit latrines needs to be studied.

BAMBOO PIPELINE

Description: Bamboo could be a good substitute for metal water pipe. A bamboo pipe is easy to make with unskilled labour and local materials and is cheap. It can be used to transport water to villages and can be used i place of galvanized iron for deep wells. It is most suitable in areas where the source of supply is higher than the area to be served and the flow is under gravity. It is claimed that a bamboo pipe kept under perennial wet conditions can outlast a steel pipe.

Material: Chisels, nails, cotter pin or linch pin, water-tightening materials, tar, rope.

Process:

(i) Drilling: Since a bamboo is not hollow all through, and there are internodes at intervals of 30-80 cm. where the bamboo pipe is blocked, to remove these blocks drilling is required. For this a drill bit is made (Fig. .1) by flattening a 12 mm. mild steel rod or bolt to the necessary width by simply hammering it against an anvil. This is fitted to a 1.5 cm. diameter G.I.pipe of thelength of bamboo i.e.7 metres. The drilling operation is fast and easy as each node is pierced, the thruster pushes the bit into the bamboo to the next node and the drilling continues. Three workers can easily bore out a dozen 7 m. bamboo poles in one hour.

(ii) Installation: To instal the drilled pipe the usual pipe laying practices are used. However, for joining purposes the methods adopted are shown in diagrams A, B & C of Fig. 2. Joints are made watertight by caulking with cotton wool mixed with tar, then tightly binding with rope soaked in hot tar.

Source:

National Building Organisation,
Nirman Bhavan, Janpath,
New Delhi.

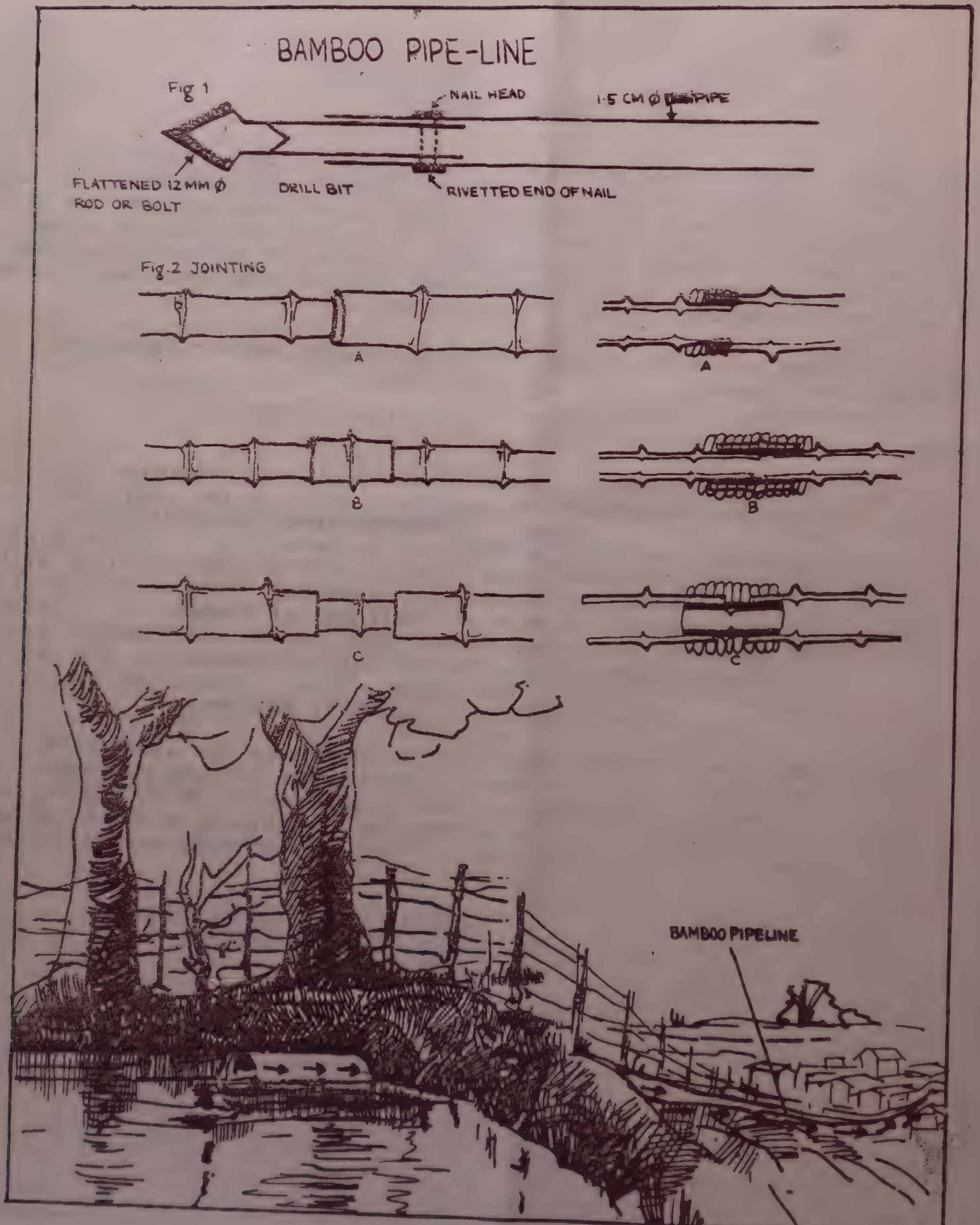


Fig 1
NAIL HEAD
1·5 CM Ø PIPE
FLATTENED 12 MM Ø ROD OR BOLT
DRILL BIT
RIVETTED END OF NAIL
Fig.2 JOINTING
A
A
B
B
C
C
BAMBOO PIPELINE

BAMBOO PIPE-LINE

PULSE DEHUSKER

Description: Hand operated paddy and pulses shelling machine - called grihini paddy dehusker' is a new design for paddy dehusking in which the grinder comprises of two circular stones which are placed horizontally over one another, and where the lower stone rotates and the upper one is fixed. The distance between the two grinding surfaces can be adjusted. There are thrust and ball bearings fitted to keep the system very light. (Fig. 43.1) . It is manually operated and has the capacity to dehusk 80 Kg. of paddy per hour. The broken rice grains are less than four percent.

The bonded under-runner grinder as it is also called, is much better than the tradiational hand-grinder as it is lighter. The grinding stone can be moulded with locally available stone grits and has a longer life, more production, less breakages and has an adjustable disc.

The same grinder can be adjusted for dehusking pulses and can in eight hours prepare two quantals of 'dal'.

Construction: In the diagram the various parts are shown as they fit each other and on the right (bottom) is given the machine after it is fitted. (Fig.43.2).

Process: The paddy or whole pulse (dal) is fed through the hopper and as the handle is rotated it is displaced down in the grinding space where it is lightly abrased by the stones and is deshelled.

Approximate Price Range: The price of the grinder is approximately Rs 600 and it has a capacity to give a wage of Rs.20 per day to two women.

Source: J.B.Central Research Institute,
Maganwadi,
Wardha
(MAHARASHTRA)

43 PULSE DEHUSKER

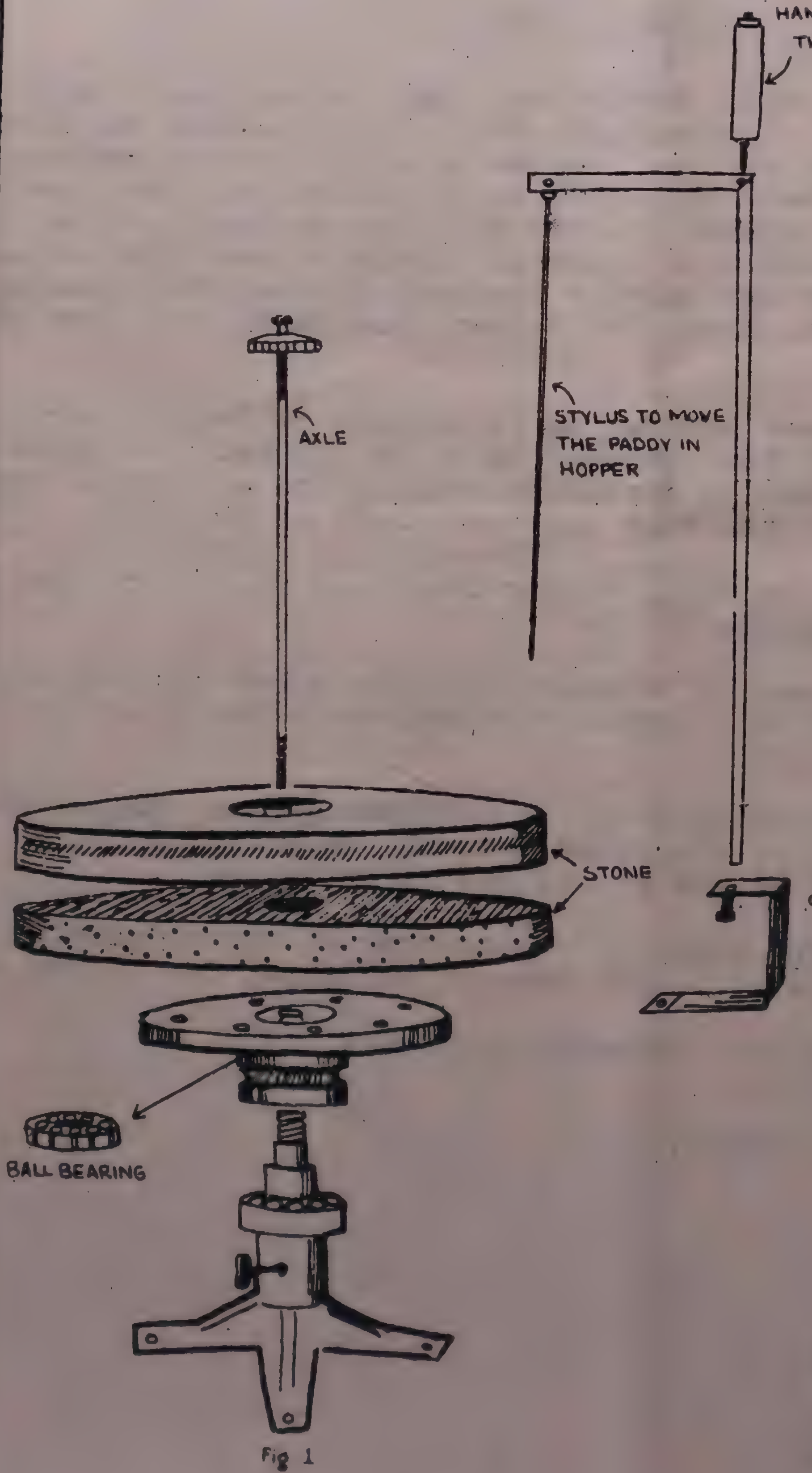
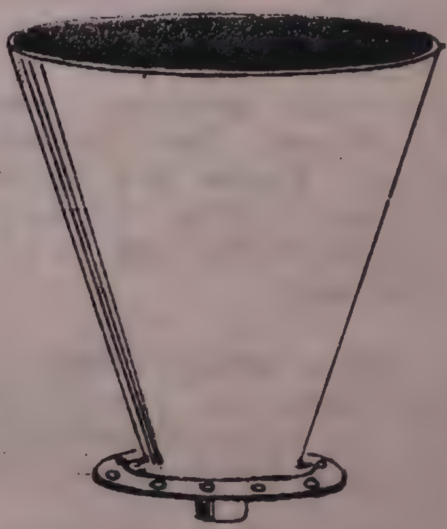
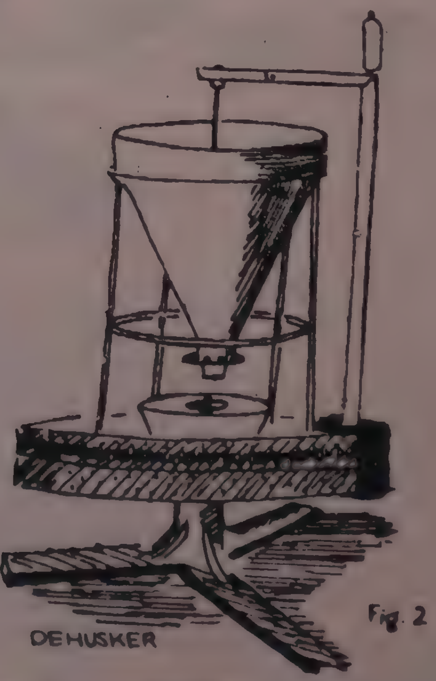

HANDLE FOR ROTATING THE LOWER STONE
STYLUS TO MOVE THE PADDY IN HOPPER
AXLE
STONE
CLAMP FITTING LOWER STONE
BALL BEARING

Fig 1

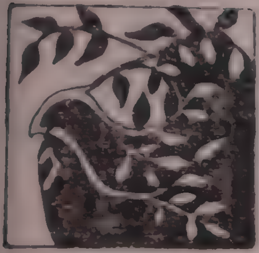


HOPPER



DEHUSKER

Fig. 2



Control Of Weeds

Weeds have been defined as plants for which no use has yet been found. Listed below are abstracts of papers and notes relating to weeds for which uses have been ound. On the other hand, more and more weedicides are being used to control weeds which are still consi-red harmful. The weedicides casue pollution problems and often damage good plants too. Methods of controlling such weeds without he use of chemical weedicides should be used. Some such methods are described below.

Traditional Weed Control

This project examined farmers traditional weed control practices in four villages and trials of 'improved' weed control methods, using herbicides in groundnut and sorghum crops, were carried out in the armers own fields. It concluds that farmers practice excellent weed control and that the 'improved' methods involving herbicides have no place in the existing systems. (The Potential for Introducing Improved Weed Control Methods to Small Farmers of the Indian Semi-Arid Tropics. E L P Davies. (1979) M Agric Sci Thesis Univ of Reading, UK.)

The Wood Plough Vs 'Improved' Ploughs

This study examines the benefits from the use of the mouldboard plough and three-tine cultivator as substitutes for the wooden deshi plough. Farmers adopt the mouldboard plough primarily because of its assistance in control of weeds, especially grasses. It is not used as a substitute for the deshi plough nor does it save time in seed bed preparation. The 3-tine cultivator does save time in seed bed preparatien. The 3-tine cultivator does Save substantial time when it is used as a substitute for the deshi plough. Richer farmers with two or more pairs of bullocks prior to the adoption of the new implements may be able to greatly increase their income by substitution of the plough and cultivator for the deshi-since the implements make possible the disposal of one pair of bullocks. For the small farmer, in contrast, the adjustments necessary to profit from savings in contrast, the adjustments necessary to profit from savings in bullock-hours and person-hours may not be feasible or attractive. (The Economics of the Mould,Board Plow and Three-Tine Cultivator in two districts of Uttar Pradesh. J. H. Forster. Indian J of Agricultural Economics (1966), 21 (2) : 47-66)

Weeding for Paddy

The importance for weed control of proper land preparation (deep ploughing, repeated harrowing and puddling before transplanting), often inadequately performed by farmers, is emphasized. The use of traditional tall varieties, close spacing and transplanting all help the rice compete with weeds; mechanical transplanting which transplants young seedlings (about 15 cm tall as oppsed to about 23 cm tall for hand transplanting), is much less effecfive in suppressing weed growth. A water depth of at least 15 cm is reccommended for maximum suppression of weed growth. Seeding at a high rate followed by harrowing in two directions (in and across rows) reduces the need for manual weeding in the rows. This method is also employed with broadcast-seeded rice in West Bengal. Growing corn and mung beans in rotation with rice reduces subsequent weed stands.(Integration of Weed Control Practices for Rice in Tropical Asia, K Moody et. al. BIOTROP. 1977.)

Water Melon & Sweet Potato Control Weeds

Evaluations in maize, tapioca and yam. The low-growing water-growing water-melon* effectively suppressed weeds without altering yields. Sweet potato was equally competitive against weeds, but also reduced yam yields. (Weed Control in Intercropping. International Inst of Tropical Agri. Annual Report for 1978 Nigeria.)

Mulching with Aquatic Weeds :

Aquatic weeds were used as mulches in sunflower crops. Weed mulches 15 cm deep gave 15-93% control of weeds and Typha spp* were the most effective; moisture retention in soil was increased by 17% under the mulch. (Weed Out Weed with a Weed. Intensive Agriculture (1980) 18(6) : 23-24. Mehta & Boonla.)

*Hindi : patera, mothitrina, bora;

(Contd. on page 15)

A Profile of Common Diseases In India

Some national estimates have been derived by extrapolating results of occasional studies sample surveys and routine reports. The following figures, unless otherwise specified are the estimates of the Director-General, Health Services.

Tetanus : In 1981, nearly a quarter million infants died in the first month of life. The estimated mortality rate from tetanus is 13.3 per 1,000 live birth in the rural areas 3.2 in urban areas.

Poliomyelitis : Estimated number of cases ranged from 141,000 to 234,000 a year. Annual incidence rate is around 1.5 to 1.8 per 1,000 children. 0-4 years.

Measles : Estimated number of cases was 0.96 million in 1977. The case fatality rate is 1.3 percent.

Tuberculosis : There are about ten million patients In India, a quarter of them infectious. Some 500,000 death occur annually from tuberculosis, most of them in children below 15 years. The rate of infection is 0.8 percent in the 0-4 year age group. 1.1 percent in the 5 to 9 age group and 2 percent in the 10-14 year age group.

Typhoid : Some 300,000 cases are reported annually, the majority among school children, The number of unreported cases would be large.
Diarrhoeal diseases : About 10 per cent of total infant deaths are due to diarrhoea. An estimated 1.5 million children under five years die of it.

Actual Respiratory Infections : Over 17 percent of infant deaths are on this account. the proportion being next only to premature births.

Malaria : The number of cases reported was 75 million in 1976 and 1.6 million in 1983.

Filariasis : About 14 million persons have filariasis, a larger number are micro-filaria carriers. Some 304 million live in endemic areas.

Trachoma : Assessed as responsible for five percent of all blindness and visual impairment cases.

Rheumatic Heart Disease : Estimated prevelence rate is six per 1,000 population (ICMR Report 1982-83). About two million children between 5 and 15 years of age suffer from rheumatic fever and rheumatic heart diseases.

Hypertension : In population aged over 40 years 10 to 30 percent hypertension.

Diabetes Mellitus : An estimated 1.8 percent of the population suffer from the disease. (ICMR National Study 1972-75)

Nutritional Anaemia : Estimated prevalence is 60 percent among children of pre-school age (ICSSR-ICMR Report 1981).

Vitamin A deficiency : Around 300.000 new cases of xerophthaimia about half of which result in blindness, occur each year in India. Percentege prevalence : 1974-80, of Vitamin A deficiency signs (Bitol spots) in pre-school children. 1-5 years, ranges from 0.1 percent in Kerala and 0 2 percent in Maharashtra to 2.6 percent in Andhra Pradesh and 3.2 percent in Tamil Nudu (National Nutrition Monitoring Bureau. The overall incidence of blindness is estimated at 1.4 percent (1982-83). Around 30,000 children go blind each year due to serious vitamin A deficiency. ▣

राष्ट्रीय प्रयोगशालाओं को
गरीब की झोपडी से
जोड़नेवाली हिन्दी की
द्वैमासिक पत्रिका
ग्रामोपयोगी विज्ञान

हमारी राष्ट्ररूपी श्रंखला की सबसे कमजोर कडी है हमारे गांव। जंजीर की मजबूती उसकी बससे कमजोर कडी में होती है। आइए, इस कडी का दृढ बनाने में हमारा सहयोग करें– 'ग्रामोपयोगी विज्ञान' पढकर।

वार्षिक चंदा
व्यक्तीगत : रु. ५/–
संस्थागत : रु. १०/–
संपर्क करें : ग्रामोपयोगी विज्ञान
केंद्र, मगन संग्रहालय,
वर्धा-४४२००१, महाराष्ट्र

Afforestation Need of The Year

(Abstracts from a Radio discussion by Shankar Ranganathan, Prof. P. V. Bole, Shanta Chatterjee of Bombay as published in the booklet of the above title by Ion Exchange Ltd., Tiecion, Mahalaxmi, Bombay- 11)

* Fifteen years ago, a World Bank study indicated that 240 million people in India have an income of only forty rupees a month. The number now is probably 350 million or half of the total population. How far would forty rupees go to feed even one person? The reforestation of India would provide gainful employment to many millions of the rural poor and draw them out of the well of poverty.
* Prime Minister Rajiv Gandhi wants five million hectares of degraded land to be brought under tree cover annually. This exceeds the total area reforested in the last thirty years and does seem a most ambitious target. Yet it is a goal which needs the support of the nation.
* From an environmental point of view, a third of the land of a country ought to be under forest and grass; mountainous regions especially, which are the watershed or catchment areas of river systems, and river banks to be under the permanent protection of forest cover to minimise erosion and to store water from rain and snow which would be gradually released.
* Recent satellite photographs show that no more than about 10% is actually under forest cover That is to say India, which probably had 35 to 40% of the land under forest at the beginning of this century, has lost three quarters of its forests in three quarters of a century. If we do not act fast, there will soon be no forests left and the resulting droughts and famines would be catastrophic.
* Our tropical sunlight can produce ten times as much tree growth as in temperate countries. Planting and tending forest plantations would increase the country's wealth in many ways. Providing employment to many millions of rural poor, it would increase their purchasing power. Reforesting denuded, unproduction areas would provide many essential commodities like fuelwood, animal feed, construction material and a variety of other produce required by rural and urban markets. The value of all these would increase the GNP considerably. Agricultural production could be raised several fold because of much greater availability of water. In addition the entire environment would improve enormously.
* Rs. 5000 crores spent in the petrochemical industry would create 50,000 jobs. The same mount spend on small scale industries might create 100,000 jobs, While in plantation or agroforestry, it would create 500,000 jobs. The employment potential of reforesting a hundred million hectares would be between 50 to 100 million jobs.
* What is needed is to develop polycultural systems of tree plantations that are ecologically sustainable and for industry to accept the higher cost of collection while doing R & D on how to use a more variable mix of raw materials. This means development of manufacturing processes that can cope with a variety rather than a single raw material. This is by no means impossible because the constituents of all woody materials are the same- cellulose and lignin in varying proportions. There is much scope here for relevant technological development. We do not need to buy this technology from abroad; indeed we cannot, because it does not exist. But we can develop it ourselves and then there may be prospects for its export.
* According to The World Bank, India's forests can produce between 75 million and 705 million cubic metres of wood annually. The lower figure is on the basis of 1 cu. m. growth per hectare per year and the higher on 10 cu. m. 1 cubic metre of dry wood produces nearly as much energy as a quarter tonne of oil. In terms of fuel equivalent therefore, our forests can provide from 17.5 million tonnes to 175 million tonnes of oil, which is three times our total energy requirement. It is practicable to produce this amount of energy

WINDOW TO THE WORLD

Blue Green Algae-Nitrogen Fixer

Blue green algae (cyanobacteria) are primitive photosynthesis are microorganisms which have the novel ability to use energy from sunlight to fix nitrogen from the atmosphere. Paddies in some areas of the Indian subcontinent and in China have been inoculated with the algae, with resultant increase in yield of up to 14 per cent.

The symbiotic (mutually helpfull) association of blue-green algae and the small aquatic fern Azolla, which will also be studied, may have been greater potential. Six known species of this fern are widely distributed in tropical and temperate regions.

Experiments at the International Rice Reasearch Institute in the Philippines have shown that with intensive management and year around cultivation Azolla and blue and green algae in association can fix up to 450 kg. of nitrogen per hectare. Even when grown with rice the combination can fix 30-50 kg. of nitrogen per hectare per crop.

At commercial nitrogen-based fertiliser applications are commonly in the range of 60-100 kg. per hectare, Azolla obviously has a large potential. The use of the fern in one area of the Philippines, where it is particularly welladapted, permitted a saving of Rs. 350 per hectare.

Bolivia : Recognises Traditional Indian Medicine

By means of Supreme Resolution the government authorized legal status to, and approved the statutes of, the Bolivian Society of Traditional Medicine.

The accord, gives official recognitation to the traditional and legendry Collawayas, Indian doctors consulted by a large portion of the Bolivian people for relief of problems of the body and soul. It is thus an act which revalues an art of car carting that for centuries has conceived of the human being as one physical, mental and emotional uni , intimately interrelated with other human beings and the environment; an art which uses the products of the surrounding environment-principally herbs-to re-establish a broken harmony.

Vaccine Against Viral Encephalitis

Soviet medical researchers have developed a highly effective vaccine which makes it possible to combat successfully one of the gravest human disease, viral encaphalitis. The disease affects the brain and the spinal cord leading to disability. Viral encephalitis is endemic in the countries overgrown with woods, and its main carrier is the tick.

(Source : World Science News Weekly, May 1985)

Clean Air

Air cleanness in Moscow is measured every six to seven hours, at different points. Environmental experts monitor closely the content of harmful substances in the air, especially sulphur dioxide, nitrogen oxides, carbon monoxide, and dust. Should the need arise, authorities can make any enterpris polluting the air suspend i operation or shut down entirel (World Science News)

Russian Solar Power Plant

The Soviet Union's first majo power plant with a capacity 300,000 kw is now begin buil in a Kyzyl-Kum desert.

A total of 5 250 mirror reflecto will focus solar energy on a stea generator placed atop a high towe Steam converted from wate under the effect of solar energ will be led by pipes to a turbo genetator which will convert sola energy into electric energy.

(World Science New

* *

(continued Page from No. 13)

and more from our forests. Y nobody seems excited. Obviousl petroleum will be difficult replace. But, at the present ra of pumping, Bombay High expected to run dry by 2000 A. and our efforts at locatin productive oil wells-like effor the world over, do not inspi confidence.

*

points to ponder

Women's Occupational Hazards :

WHO recommends measures to protect women of child-bearing age, who form the majority of women in the workforce, against hazardous chemicals and other threats in health deriving from the work-place.

In calling for safeguards, the experts point out that chemical radiation absorbed into the body could lead to mutagenity damage to genes and chromosomes not only of women but also of men.

Where a woman has conceived, mutagenity could mean foetal death. Where demage is caused to sperm or ovum it could mean congenital malformation and leukemia in newborns.

Rise in malaria incidence

The Health Ministry has admitted a rise of 18.1 per cent in the incidence of malaria during 1984. The number of p. falciparum cases, which represent a more virulent form of malaria, also went up by 12.9 per cent during the year.

During April-September 1984 there were 9.03 lakh cases as against 7.68 lakh cases in the corresponding period the previous year. The p. falciparum cases in this period had gone up to 1.89 lakh from 1.67 lakh. Fourteen States have reported increased incidences of p. falciparum.

(H. T. April 16)

Wanted—A Pied Piper

Rats live everywhere but deserts and prefer dense human settlements, especially in the warmer Third World. As urban populations have grown so rapidly, it has been impossible to provide adequate drainage, sewerage and refuge disposal. Rats favour such conditions.

There are now an estimated five billion rats in the world. In parts of India and Africa, there are 10 rats to every human.

Rats are destructive and carry disease. They eat or spoil between 10% and 25% of all grains produced in the Third World. They also carry the often deadly, infectious disease of bubonic plague which can be transmitted to humans. Third World governments spent a total of 640 million on urban pest control in 1980.

(Contd. from page No. 11)

eaf & Straw Mulches for Groundnuts

The effect of leaf and straw
nulches (applied one month after
owing) on yield of irrigated grou-
dnut crops was studied. The mul-
hes of irrigations could be reduced
rom 8 to 6, and weed growth was
ound to be less in the mulched
lots. (Yield Response of Irrigated
roundnut to Organic Mulches. J
handra Mohan & A Mohammed Ali.
nd J of Agric Sciences (1969), 39
2) : 196-199)

ice Straw Mulch for Tomatoes

A rice Straw mulch stopped
ost weed except Cyperus rotundus
ut band weeding 30 days after
transplanting, controlled surviving weeds. (Field Evaluation of Different Weed Control Approaches in Transplanted Tomatoes. E C Paller et. al. Univ of the Philipines Weed Science Report.)

Rice Straw Mulch for Cabbages

Rice straw and rice hull mulches 2.5 to 7.5 cm deep, herbicides and herbicide-mulch cultivation treatments were compared in transplanted cabbage. Rice hulls gave better control of grasses, while rice straw gave better control of broad-leaved weeds. (Weed Control in Cabbage. A M Baltazar et. al. Univ. of the Philippines, Weed Science report.)

Cover Crops & Banana Leaf Mulches

Four legume cover crops (Calopogonium mucunoides, Centrosema pubescens, Puereria phaseoloides and Vigna unguiculata**) and two types of organic mulch (grass mulch and banana leaves) were compared with slashing. Weed species distribution was identical in plots seeded with P phaseoloides or mulched with banana leaves. The latter was more effective in suppressing weed growth. The least effective was C mucunoides. (An Assessment of Cultural Weed Control Methods in Coffea Canephora. M A O Oladokun. In: Weeds and Their Control in the Humid and sub-humid Tropics.)** Hindi: lobia, riantshi, rawan, santa. ▣

SFV, June 85
WDA-119

NEW BOOK

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A collection of articles of thought provoking original ideas by Gandhi's famous associate and economist J. C. Kumarappa intersprsed wirh interpretative current articles by Devendra Kumar, Editor 'Science for Villages' under five heads; To the Scientists, Economy of Peace, Which Way Technology, Rural Technology and Decentralised Planning. A real collector's item for all intellectuals.

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Cover page printed on Hand Made Paper : Printed and published by Devendra Kumar on behalf of Sciece for Villages, Wardha, Editor : Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha, 442001, Printed at Samyayog Press, Wardha.

SCIENCE FOR VILLAGES

Building a Bridge between the Science Lab and the Village Mudhut

o. 94 July 1985. Monthly. Annual Subscription : Rs.15 -(10 Dollars) Individual and Institution Rs.25/-(15 Dollars

C.F.T.R.I., MYSORE

FD-36

Ecologically Sound And Socially Just

The technologies which lead to quantitative increase in consumption without adding to the quality of life and peace on earth, add to the burden on Nature already under strain. These are also such as do not help those who are still deprived in basic amenities of life. To this category belong; five star hotels, tourist resorts, luxury articles of all sorts and massive passive entertainments in sports, films and the like. These do not give self-expression to or increase the productive and earning capacity of the teaming millions. They only cater to the ever increasing wants of the affluent section which has money to spend for such purposes and wherewithals to earn it at the cost of the interests of the masses-almost half of who are still living below the level of subsistence.

Then there are systems of production and services which require heavy inputs. These also sustain the affluent class of people and help to enrich them still further. For example in agriculture when we proceed towards high yielding sophesticated hybrid seeds and commensurate use of chemical fertilizers, pesticides and growth controllers etc. along with power machines for ploughing, sowing, irrigation, interculturing, harvesting, thrashing and storing etc. we do increase production and bring down its cost as to be more competetive but it has its weak points.

The inputs reqired for this increased production are all such which the poorer among the farmers cannot afford and so the benefits of the new technology accrue more to the region and the section that is comparatively more prosperous, thus making disparity more pronounced.

Progressively more and more expensive inputs are suggested for greater and greater productivity like the proverbial carrot in front of the donkey. And the people find that gradually the cost of industrial goods that they use as inputs in their agricultural production takes away larger and larger share of the output making them sweating themselves for the input producers and marketers.

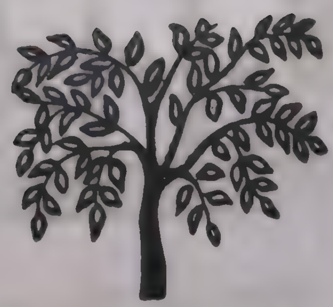
In a village where I spent eight years I found that the cow and buffalow owning families were getting loans for purchase of their milch cattle and concentrates to feed them from a moneyed urban operator. In return he took back their milk at a price he dictated, ultimately leaving his victims only enough to survive and continue being milched by him. Simlar vicious circle develops when high capital inputs imported from urban economy are brought to the rural economy.

In one of the studies, of the U. N. sponsored aids and development programmes for the Third World, a sad and tragic aspect has been brought out where the international manufacturing firms of articles that are to be given under the schemes influence in the drawing such projects and mould it as will benefit their interests more than that of the poor and the oppressed for which. the aid is meant. This kind of exploitation is inherent and unavoidable when the development of the weak is sought through means over the production and distribution over which they have no control.

Hence if our planning is meant to assist the weaker section first the modes of bringing relief to them are to be such that the inputs required for increasing their productivity are of a kind which do not make them dependent on forces of the market economy which is loaded in favour of the competetively strong. Otherwise the apparent improvement in the situation of the have-nots will only be making the yawning gap between them and the haves still higher.

The appropriateness of the methodology of production should always be gauged by the social justice quotient inherent in it and at the same time the effect it has on enriching the ecological and environmental content of the natural surroundings. The search for ecologically balanced and socially just methods of production only can lead us to a balanced wholesome Progress where prosperity and peace re-inforce each other.

Devendra Kumar



From The Plants

Plant with a healing touch

Use of Silars (altingia exelsa) an indigenous plant, cures many diseases that shorten the human life Clinical evaluation of the plant extract has revealed that the drug checks premature aging process, hypertension, kideny diseases, migrane besides stress indicated diseases like general arterioscalr rosis (thickening of heart arteries)

Research on the plant, sponsored by the Central Council for Research in Ayurveda and Siddhas, also showed the drug besides being anti-stress also increased endurance and checks for matron gastric (stomach) ulcers.

The drug had been found to be innocuous with varying toxicity and produced minimal physiological disturbance said Dr. Narendra Singh, head of the evaluation team of the Deptt. of Pharmacology, King George College, Lucknow.

Kokum Fruit Could Reduce Obesity

Scientists at the National Institute of Nutrition (NIN), Hyderabad have found definite leads that dry Kokum fruit used as a substitute for tamerind in Western India can help in preventing obesity. Hydroxy citric acid main component of dried Kokum, a plum like sour fruit has been identified by Dr. Shenolikar's group at the institute to inhibit obesity in man. Shenolikar said tests on experimental animals had conclusively shown at the institute that intake of the hydrosy citric acid through kokum prevented fat and cholestorol synthesis in them. (Nagpur Times 3 July'85)

Fat Reducing Herbal Medicine

A new harbal medicine from Jiangxi province in China helps remove excess fat by invigorating blood circulation and stimulating body metabolism, according to a Chinese magazine. The medicine is particularly valuable for hypertensives, diabetics and other patients suffering from ailment requiring strict dietry and weight control. Dark brown, crystals like herb is dissolved in water and taken daily. The major active ingredients in the new weight reducing remedy are lotus leaves which have been used for medicinal purposes since ancient times.

(Nagpur Times- 15 July '85)

Tick-Killing Legumes

Two species of South American tropical legumes have been discovered to be deadly enemies of the hard shelled ticks that prey upon the world's hundreds of millions of cattle and sheep. Australian researchers Robert W. Sutherst, Raymond J-Jones and Herbert J. Schnitzerling describe the plants that not only despatch insects that would dine on cattle, but also provide nutritious eating for the grazing animals themselves. Secretion from glandular hairs of Stylosanthes scabra and stylosanthes viscosa plants immobilize and kill tick larvae. Because the insects must climb the pasture grasses to await chance encounters with their parasitic hosts, the scientists assert that the deadly stalks "have the potential to substantially reduce populations of all species of tick in the extensive tropical and subtropical areas in which stylosanthes can be grown." Unlike chemical "dipping" which has begun to produce a super-resistant tick, the use of the legume for control purposes is "an attractive notion".

The scabra and viscosa species of Stylosanthes legumes are from Brazil. The Australians have imported 19 of 30 member species of Stylosanthes for testing. The legumn is particularly promising as a cattle forege because it grows like shrub rather than manifesting climbing characteristics. Professional wishing more information about Stylosanthes tick-killing research can write to Dr. Robert W. Sutherst, CSIRO, Divison of Entomology, Long Pocket Laboratories, MB 3, Indooroopilly, Queensland 4068, Australia.

(Source :- International Exchange News)

Sell Goats To Save Forests

Villagers of Kesorpur in Puri district of Orissa have sold their goats to protect their forest. They are protecting the forest from all outside interference and degredation, says "Resource", a magazine of the state department of science, technology and environment. The goats were eating away the forest. Similar protection measures are being planned by villagers in Dhankanal, Mayurbhanj and Phulbani district. In Hindol subdivision of Dhankanal district, there are 193 villagers each helping to protect between 100 to 500 hectares of village forests.

Our Cattle & Milk - a Question ?

(Abstracted form the Seminar report On indigenous breeds of cattle held in kasturbagram Krishi Chetra, Kasturbagram, Indore on October 18 to 20, 84 attended by individuals and institutions committed to the revival and strengthening of indigenous agricultnre, linked with the principles of ecology.)

India has been known, through the ages, for her cattle wealth, both in term of quantity and as well as in terms of quality. Quantitatively, approximately 20 percent of the total world-wide cattle population is in India. Qualitatively, it comprises a rich diversity of breeds, specially adopted to Indian conditions, and valued highly, for their special characteristics. Traditionally, cattle in India have been bred with multiple objectives- as milk producers, as draught animals for agriculture and transportation purposes, for their extremely high disease resistance, and for their ability to survive in draught-prone environment. Therefore Indian cattle are not necessarily the best producers of milk. However, there were and still exist specialised breeds in this country whose milk yield are comparable to the best internationally. In addition, cattle in India, have continuously contributed, in major way, towards raising and maintaining the fertility of soil, throughout India's long history of involvement in agriculture.

Even if one were to consider milk production as the major objective, there are many Indian cattle varieties. which could have and can adequately fit the bill. For this cross breeding with local high-milk-yielding varieties of cattle would result in maintaining the standard of disease resistance, its utility as draught animals, or its ability to survive drought-prone environments. Such high milk yielding varieties of cattle are found throughout India, but are slowly disappearing under the onslaught of the cross breeding programme centered around exotic foreign breeds. In cows, for instance, the Red Sindhi yields around 5,440 kgs. of milk per lactation period, the Sahiwal, around 4,900 kgs, of milk per lactation period: the Tharparkar around 4,375 kgs. per lactation period; several others like Gir, Kankraj, Ongole, Gaolao, etc. which give over 3,000 kgs. of milk per lactation. In buffaloes. varieties like Murrah, the Jaffarani, Surti, Mehsani, Nagpuri etc, are known to produce over 3,000 kgs. of milk per lactation (with fat percentage 7.8%). In addition to the milk production, the males are extremely good draught animals, evolved over generations within the indian environment, incorporated a high degree of disease resistance, in comparison cross-breds with exotic foreign breeds avarage between 3,000 to 4000 kgs. of milk per lactation period. There is therefore ample evidence that we need not necessarily cross-breed with foreign exotic breeds, even if we do want to improve the milk production capacity of the average Indian cattle.

Milking the Poor

Cross breeding with foreign exotic breeds. In doing so, especially through the process of artificial insemintion of frozen semen, we are progressively reducting the genetic diversity of Indian cattle, thereby increasing tremendously the risks, relating to their survival. Today increasingly. such survival is becoming more and more dependent on organised industry, which sees this as a tremendous opportunity for profit making. The security of our cattle wealth is getting concentrated in the hands of a few. In this process, local breeds are allowed to languish and die out. This trend is extremely dangerous for us and our country, and positively suicidail for the poor villager/farmer.

Cross-breeding is not only expensive. it also is cornering our common resources to maintain such expensive animals, This is bound to lead to decrease in milk production nationwide, since most of the milk collected is still produced by poor villages and tribals. Results of cross breeding can be obtained only after three generations. Already it has been observed that there is a reduction of 15% in milk yield in the second generation. The whole picture about the future of such cross breeds is dark.

'Phoren' Cows

The establishment of European Economic Community of Operation Flood, some years ago, so much of Skim Milk Powder and Butter Oil got accumulated in the E. E. C. stocks that it was described in the newspapers as "Mountains" of skim milk powder and "Lakes" of butter oil with no purchaser in the world at the prices demanded by the producing countries.

India came prominently into the picture to become a country to absord the superfluous milk powder, butter oil and dairy machinery. liquid Nitrogen plants and containers, pasturisation plants, cold tankers, etc. for establishing a dairy industry, and at the same time, becoming a bountiful source of beef to feed the starving beef-eaters. To push the operation Flood down our throat, no help was denied and no scruples spared. Our scientists were assured that in order to make our cows better milk yielders we should take to exotic crossing and expedite the process by adopting artificial insemination which presupposed castration of the indigenous male cattle. We accepted all and sundry exotic breeds that were donated on given cheap by other countries on the foolish presumption that every foreign breed is better than our best and that the progeny will be able to withstand our climate. Blinded by our "milk-fever", no one bothered to think about the male exotic cross as the future bullock for the plough or draft; probably felt assured that the hybrid male would make as good a bullock as the indigsnous male. No one bothered to think whether these cattle will withstand the Indian soil and climate to maintain the performance or that we would not be importing serious disease hazards.

We most strongly feel that the birth, and the manner of working, of Operation Flood is so much tilted against the bulk of the rural population that it must very seriously undermine the very peaceful existence of the nation in a not too distant future.

(P. P. S. T. group, 17-South Mada Street, Triplicane, Madras-600005

Poverty :Wealth of Mankind

Dr. Albert Tevoedjre, Deputy Director-General of the International Labour Organization, Geneva has in a recent book 'Poverty : Wealth of Mankind' (published by Pergamon Press) warned developing countries about the potential dangers of industrial affluence, and commends a rural lifestyle which would allow basic needs to be satisfied at the same time preserving the community spirit. The urgent need according to him, is for developing countries to avoid the evils attendant on over-industrialisation such as break of families, urban concentration, pollution etc.

Some extracts from the book :

▣ Gandhi maintained that true civilization consisted not in multiplying our needs but rather in restricting them volantarily. This, he believed, was the only way to find happiness and become more open to others. To seek create an infinitude of needs that would then have to be satisfied was, in his view, an endless and useless quest.

The more production expands, the more pollution increases. The more sophisticated the production, the more dangerous the pollution.

▣ What are known as the diseases of civilization various forms of cancer, cardio-vsscular troubles, nervous breakdowns-are becoming commoner and affecting ever younger people, to an extent that sometimes seems to reach epidemic proportions- and this is happening in almost every industrialized country.

▣ In contrast with the growing frustration of industrial societies we can turn to the profound wealth of many societies in Africa and Asia, where the family brings together under one roof the direct and collateral relations of several generations. The insane live in the village are accepted and feel that they are acknowledged, As soon as industrialization turns people into specialists, however, every change from a closed - circuit economy to an exchange economy is accompanied by a reduction of the family to its simplest form.

▣ From every side, then, unrestrained wealth is being called into question as are the privileges derived from it. Everyone proclaims the right of all to share goods and property. Why should the Third world adopt a model that has broken down and has sometimes even turned out to be positively harmful ? After all development is surely an effort to conquer oneself and work with others, an effort that relies on the natural environment to meet the basic needs of the family and through solidarity of the group.

▣ Turning our bank on our history and geography, our arts and our skill, we reject growth based on our own strength and resources. Putting the immediate interest of the few before the long-term benefit of all, we prefer to widen the narrow circle of the privileged from time to time and to go on slicing the energy of the great majority of the people.

▣ Because of the money that we must have at all costs, we are in danger of finding ourselves with no more true culture, no freedom, no respect for anything, no family.

▣ You say I am too pessimistic ? that such statements are totaly groundless ? This would be true were I unable to provide proof of our folly.

(IDS Newsletter)

FISHERMEN : Their Problems

By A. J. Vijayan

In India there are about 6.5 million people who depend on fishing and allied activities, representing about one per cent of our total population. 3.5 million fisher folk live along the coast line and others on the banks of rivers, lakes and backwaters. Among the sea-going fishermen more than 80% are in the artisanal sector who operate small-scale traditional crafts and gear. India has a coast of 5650 kms. and the fishermen live in about 2500 villages. They have about 1 5 lakh fishing crafts and 7 lakh gear and tackiee. The most distinctive feature of this artisanal fishing technology in India is its hetrogeneity. conditioned by the physical geography of the coast and partly by the nature of the resource base. The dug-out canoes are mostly seen in West Coast because of the calmer waters, whereas catamarans are seen mostly in the East Coast because it is the ideal type for open surf conditions. Large drift nets are in use where demersal species predominate, seines are the most efficient where pelagic, shealing fish move to inshore waters to feed; the hooks and lines are the most appropriate for deep water fishing. Though most of the equipments and techniques are not the result of indigenous innovations, there has been a great deal of adaptation of these imported techniques to local conditions both physical and social. Considerable technological change took place in the artisanal sector during the last 50 years. Introduction of nylon nets in place of cotton nets was significant. This has impact on this sector in terms of increasing catch and introduction of new types of nets. Compared to the modern, large scale fisheries, artisanal sector is decentralised, of lower costs and absorb all available labour force.

Fish resource estimates for Indian waters place the annual potential yield at 4.5 million tonnes. Of this 53% lie in the depth zone of 0-50 mts. (Inshore waters). 36% in 50-200 mts. depth (deep seas) There are many regional imbalances in the availability as well as exploitation ef different species due to various reasons.

The Indo-Norwegan Project where a developed country through the agencies of the UN in an attempt to transfer resources and knowledge. The objective was to raise the productivity of fishermen and improve their standard of living. This collaboration resulted in the introduction of a new small boat with sufficient engine power using the shrimp trawl net as main gear. The INP also initiated in providing additional infrastructural facilities like ice plants, freezing and processing technology to cope with the Increased production and thus to further improve the exports. Within 6 years, the trawling boats increased to 700, and its share in fish catch rose from zero to 94%. Slowly by 1975, mechanised fishing centres with the same technology came into existence in small pockets in most of the maritime States in India. Prawns catch reaced new heights end foreingn exchange earnings from this sector ran into crores. The major beneficiaries were exporters, finance capitalists and boat owners in our country and the already overfed consumers of the developed countries.

Irrespective of our technological cnoice, there are certain features of our seas which we cannot alter. For example, of the total annual potential yield of 18 lakh tonnes of prawn resources over 85% is in the inshore waters. That means the modern sector should concentrate in that area if they have to catch prawns for profit. It is the same area where lakhs of artisanal fishermen work; they are capable of working only there. Their operational efficiency had improved substantially with the large scale introduction of nylon nets. In areas where mechanisation had taken place, the artisanal sector have proved that they are capable of catching more than 75% of the available fish in the inshore waters.

At the all India level, marine fish catch increased from 7 lakh tonnes in 1960 to 13 lakh tonnes in 1981. Though the catch almost doubled, we cannot attribute this to the mechanised sector. For example, if we take the case of Kerala where large number of small trawlers operate, according to official government data the maximum annual fish handings of 5.41 lakh tonnes was in 1973 of which the share of the mechanised sector was just 20.6%.

Total number of active sea-going fishermen in the artisanal sector all over India increased from 2.3 lakhs In 1960 to 4.5 lakhs in 1980. Their total number of fishing crafts also rose from 90000 to 150000 during the same period. There are now about 160000 mechanised crafts operating all over India and their share in terms of of quantity in the total fish landing is only between 20 to 30 per cent but their share in the total value of fish (price) is in between 50 to 60 per cent. So what actually happened over the period of planned fisheries development was, the artisanal fishermen worked more hard, their number increased, their investments and crafts increased, and they produced more but got less income and became more and more poor.

Big Fish Eating Small

Conflict and depletion of fish resources were other results. In the latter half of seventies we witnessed regular violent clashes between artisanal fishermen and trawlers at sea causing over 50 deaths and hundreds injured, burning of trawlers, destruction of country crafts and nets etc. The catch figures Show a slow decline reaching 1.37 million tonnes in the case of prawns the catches went upto 2.2 lakh tonnes in 1975 and afterwards declined steadily and reached 1.45 tonnes in 1981. Our fishermen say that many species are slowly vanishing and the average size of the heavily exploited species is on the decrease.

Over capitalisation in the modern fishing sector has resulted in less income. Many have now shifted their capital to cinema, luxury hotels etc. It has resulted in growing unemployment and under-employment among the proletariat in this sector-boat workers, women in the peeling and processing plants etc. Many are slowly returning to the artisanal sector again. Some capitalists have moved to areas where there is still potential prawn catches. Thus we have a new phenomenon in this sector: growing number of migrant workers.

The new technology along the West coast in the name of diversification is Purse-seining. This is promoted in the name of exploiting deep sea resources and to increase the catch. The result was just contrary.

In Kerala, about 100 purse-seniers started operation in the last four years. It caused more threat to the artisanal fishermen than that of the trawlers. In Kerala about one artisanal sea-going fishermen depends on athing oil sardines. This is the important fish resource for these fishermen in terms of quantity. It is available only in inshore waters. The annual potential yield of oil Sardines is estimated at 1.35 lakh tonnes and the artisanal fishermen with their canoes and nylon nets were catching the maximum. The purse-seiners came in, its share in the oil Sardine landings of the State increased from 3% in 1979 to 41% in 1982. The introduction of purse-seiners had in no way resulted in a sudden decline of the catches in the artisanal sector. So year after year thousands of fishermen were thrown into poverty and unemployment.

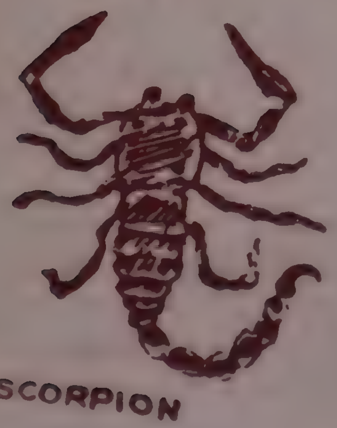
In 1978 Goan Fishermen Union took initiative and convened a meeting of fisherman representatives from different parts of the country and it resulted in the formation of National Forum for Catamaran and country boat fisherman's Rights in Marine Wealth. The Forum met in Delhi and forumulated major demands and organised a sit-in strike in front of the Agricultural Minster's residence. The demands were :

- Trawler-free zone of 20 kms. from the sea shore.
- Deployment of Coast guards to assist the artisanal fishermen.
- Protection of the sea from all kinds of pollution.
- Stop evacuation of fishermen from the seashore in the name of tourism and beautification.

By 1983 four maritime States enacted Marine Fishing Regulations Act and it prohibits Purse-seiners and other large vessles to operate in coastal waters upto 22 kms. from the shore. The trawlers are permitted to operate only beyond 5 to 16 kms. from the shore. But, so far in none of these states these laws are strictly enforced. ☼

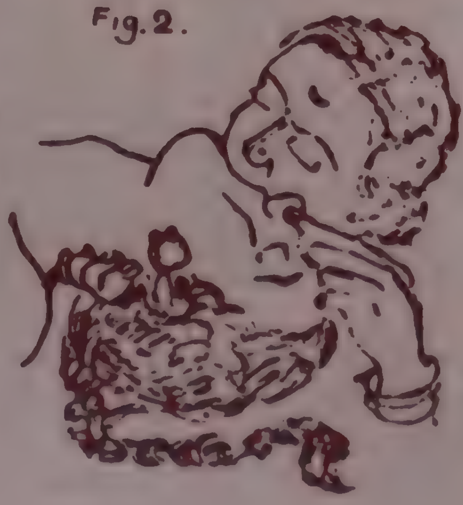
SCORPION STING

Fig. 1



MOUTH-TO-MOUTH BREATHING IF BREATHING STOPPED

Fig. 2.



A DROP OF LIME IN A PINCH OF POTASSIUM PERMAGNATE

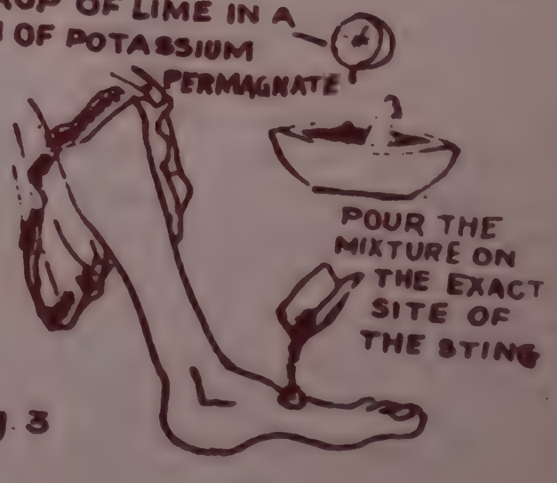

POUR THE MIXTURE ON THE EXACT SITE OF THE STING

Fig. 3

Scorpion Sting

Some scorpions are far more poisonons than others For children under 5 years old, scorpion sting can be dangerous, especially if the sting is on the head.

What to do for Scoropion stings

If it is for the first time in an adult, do the following.

— Give aspirin and if possible, put ice on the sting.

— Inject Novacaine (5 to 10ml) around the sting

This helps reduce pain but may give only temporary refief

— Anti histamine tablets can also be given.

If it stings for the second time in an adult or in children under. five, do the following :

— Seek medical help, as early as possible.

— If breathing has stopped, do mouth-to-mouth breathing

— If the person is in shock, treat the shcok.

— If the child who was stung is very young, or has been stung on the main part of the body or if the sting is for the second time seek medical help fast.

For an effective home cure for the first scorpion sting in adults, do the following

— Cut a piece of onion and rub it on the site of the sting. This helps in relieving pain

— Grind a small pinch of potassium permanganate with equai amount of citric acid. (If you cannot get citric acid powder, you can use one drop of lime juice). Collect the powder into a paper and spread it over the exact sitc of the sting. Add a single drop of water. It will begin to bubble vigorously and will become very hot. This usually gives immediate total or partial refief.

Warning

Tender skin may get badly burnt or blistered; spread the powder only on the exact site of the sting ▣

Scorpion Sting

Some traditionelly tried methods

1. Make a solution of Ammonia slaked lime and borax (suhaga) dissolve it in water and inhale it.
2. Make a paste of some garlic pods and apply it on the place of scorpion sting.
3. Mix lemon juice and common salt and apply it on the sting point.
4. Apply juice of basil leaves (Tulsi) in addition to this following method can also give reiief.
   - a) Drinking a dose of mixture made of 20 grammes of Basll leaves mixed with powdered 15 nos of black pepper.
   - b) Applying on the place of sting a thick paste of basil leaves mixed with common salt.
   - c) Applying paste of the root of the basil plant
5. Smoking of neem bark or neem leaves or neem seeds in a pipe (CHILAM) may be tried;
6. A poultice made of a thick paste of cotton leaves with mustard seeds well ground and mixed is yet another remedy.

   Drinking of mixture made out of lemon seeds and Rock Salt (SAINDAAO NAMAK) in water will aliminate the pain of scorpion sting;
7. Rubbing the roots of Achyranthis aspera (LATJEERA) at the place of scorpion sting or the entire portion affected by the poison inffective.
8. Drinking of fresh apple juice mixed with four grains (Rathi) of camphor eliminates the pain of scorpion sting. In case immediate relief is not perceptible better take the drink twice or thrice.
9. Prepare tablets mixing Bijora Lemon Juice with Asafoetida (HIng) and Yeilow opriment (Hartal) and preserve them for use. At time of need crush a tablet in a small quantity of water and apply it on the place of scorpion sting.
10. Application of paste made out of garlic pods with Belladona works wonders and the poison is made ineffective. ▣

New Books

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by J. C. Kumarappa &
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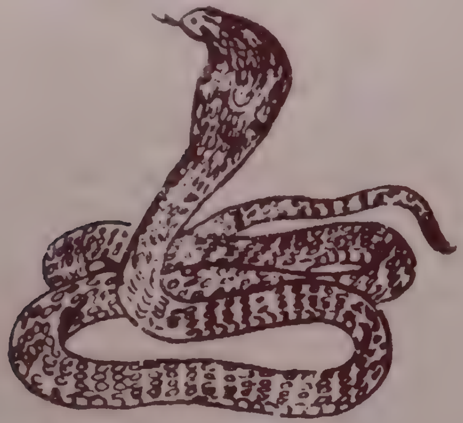
Centre of Science for Villages
Magan Sangrahaiaya
Wardha-442001.

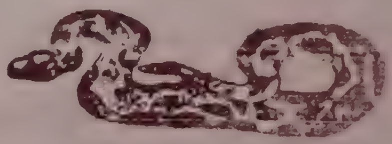
SNAKEBITE

All snakes are not poisonous, nor can they outrun man as commonly believed. There are only four common poisonous snakes in India.

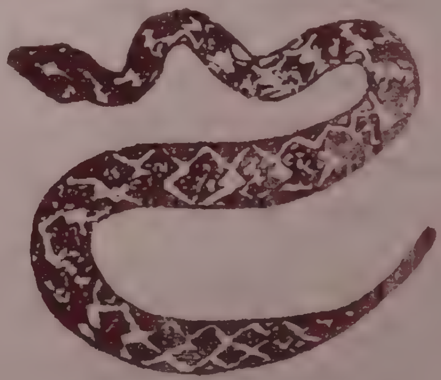
1 Common cobra (Hindi: Nag)



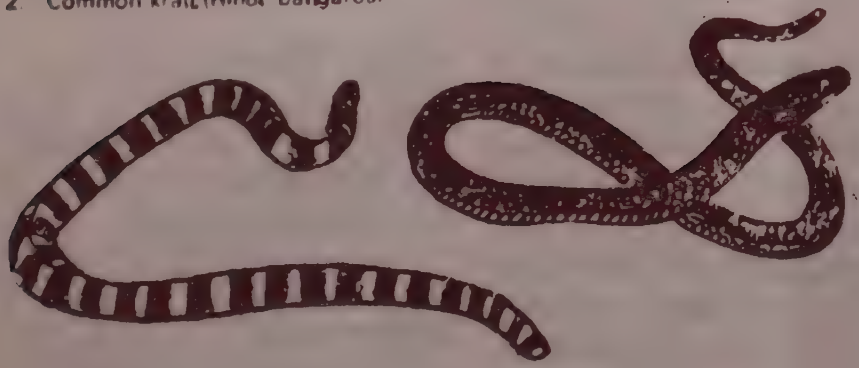
3 Russel's viper (Hindi : Daboia)

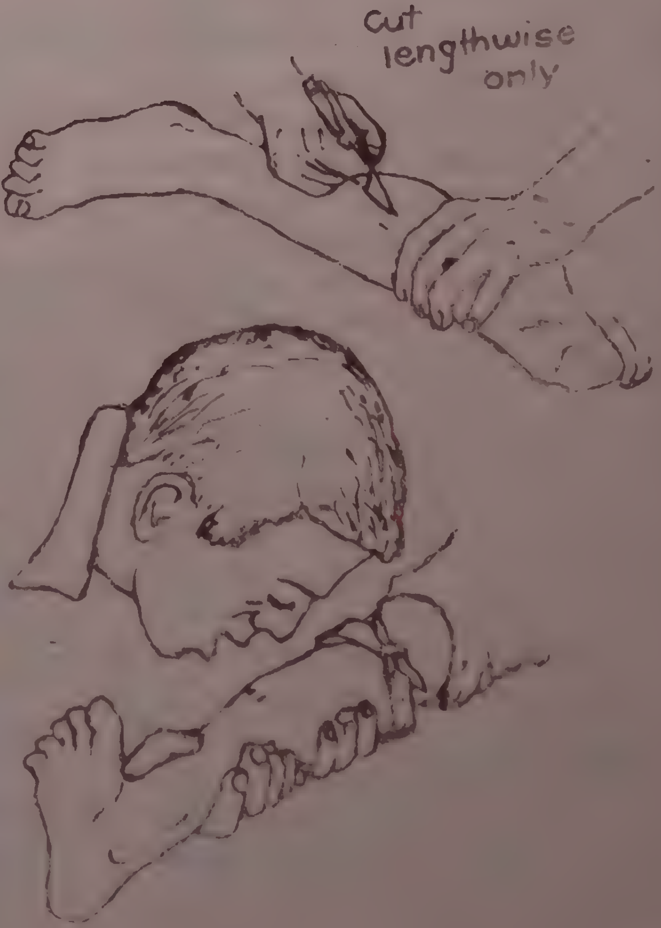


4. Saw-scaled viper (Hindi : Phoors

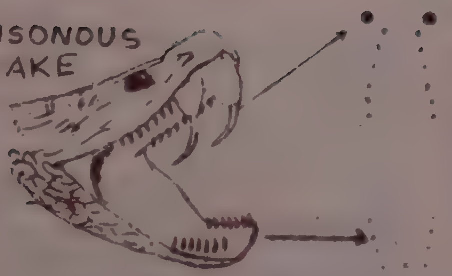


2. Common krait (Hindi bangarus)





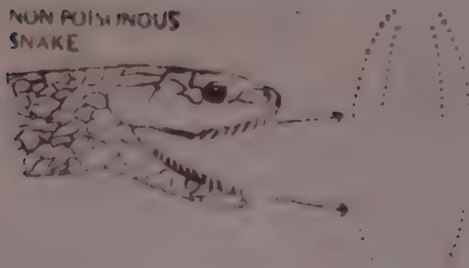
POISONOUS SNAKE



← fang marks

← The bite of a poisonous snake leaves marks of the 2 fangs (and at rare times, other little marks made by the teeth).

NON POISONOUS SNAKE



The bite of a snake that is not poisonous leaves only two rows of teeth marks, but no fung marks.

Snake Bite

All snakes are not poisonous, nor can they outrun man as commonly believed. There are only four common poisonous snakes in India:

1. Common cobra (Hindi : Nag)
2. Common krait (Hindi : Bangarus)
3. Russel's viper (Hindi : Daboia)
4. Saw-scaled viper (Hindi : Bhoorsa)

Cobra is less than a foot long. It has a clear 'arrow head' design on the head. Both Russel's viper and Saw-scaled viper have a triangular head and a narrow, thin neck.

When a person has been bitten by a snake, try to find out if the snake was poisonous or not. Their bite marks are different as can be seen from the diagram (Fig. 1&2).

Symptoms of Poisonous Snake-bite

At the site of the snake bite : local signs : These signs appear within 15 to 30 minutes of the bite :

- Pain-may be quite severe and may last for many days.
- Swelling - depends on the amount of poison that has entered the blood. In case of viper bites, pain and swelling at the site of the bite is more severe.
- bleeding from the bite - this is more common in the case of viper bite.
- Discolouration of skin around the area of the bite.
- Infection and gangrene may also develop.

General symptoms : These develop from 15 minute to one hour after the bite.

Cobra and Krait bite : effect the nervous system :

- Drowsiness
- Weakness of the muscles, especially the muscles around the eyes. The person may start seeing double (double vision) and may develop a squint.
- Paralysis of muscles
- Respiratory failure which may lead to death.

Viper bits : affects the clotting of blood :

- headache
- Nausea vomitting
- Cough with blood stained phlegm
- bleeding under the skin
- signs of shock, if there is too much bleeding.

Treatment for Poisonous Snake-bite :

1. Stay quite; do not move the part that has been bitten. The more it is moved, the more rapidly the poison will spread through the body. A person who has been bitten on the foot should not walk, not even one step if it can be avoided. Carry him on a stretcher.
2. Tie a cloth around the limb, just above the bite. Do not tie it very tight, and loosen it for a moment every half an hour.
3. With a very clean knife (sterilized in a flame) make a cut into each fang marks : about 1cm long and 1/2 cm deep (Fig 3).
4. Then suck (and spit out) the poison for a quarter of an hour (Fig. 4).

   Note :- If more than half an hour has passed since the bite, do not cut or suck the wound. By then it may do more harm than good.
5. If a person developes any of the general symptoms described above, inject Antivenin, being careful to follow the instructions that come with the medicine. Inject 1/2 c. c. of Adrenaline under the skin to prevent the person from getting allergia shock. Antivenin is most effective if you inject it within 3 hours after the bite (for some like cobra it must be given immediately).
6. If you can get ice, wrap pieces in thick cloth and pack these around the limb that was bitten.
7. Give tetanus toxoid injection to prevent tetanus.
8. If symptoms of infection develop, use penicillin.

Poisonous snake bite is dangerous. Send for medical help at once, but always do the things explained above at once.

From the book : Where There Is No Doctor by David Werner)

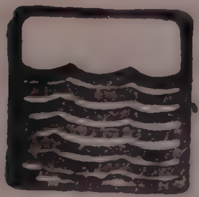
NGOs in Field of Environment

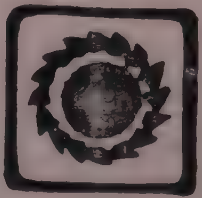
According to a recent Directory compiled by the Department of Environment (Bikaner House, Shahjahan Road, New Delhi) there are 187 Non-Governmental Organizations (NGO) in the country. The Maximum concentration is found in the Union Territory of Delhi (26) followed by the States of Uttar Pradesh (24), Maharashtra (23) and West Bengal (23).

Another aspect of this directory is that NGOs are involved in several different types of activities. Their numbers in nine prominent areas are given below in decending order : Environmental Education and Awareness (129); Nature Conservation and natural resources (56); Pollution Control (47); Afforestation and Social forestry (46); Floristic and faunal studies (28); Rural Development (11); Wildlife conservation (10); Waste utilisation (10); and Eco-development (9).

Apart from this, the NGOs also bring out very useful publications on environment. These include reports, proceeding of seminars and workshops, newsletter and journals. The participation of NGOs in conducting the seminars/symposia/workshops on environment has contributed significantly towards the cause of environmental education and awareness. This has also helped considerably in mobilising public opinion for the promotion of environment in the country. Prominant amongst them are as follows :

1. Academy of environmental Sciences, C-30 shastri Nagar,
   Meerut (U. P.)
2. Action for food Production
   C-17 Community Centre
   Safdarjang Devpt Area, Delhi
3. Ahmedabad Study Action group
   Dalal Bldg. Behind Hotel Capri
   Relief Road, Ahmedabad
   (Gujrat)
4. Centre For Science & Environment
   807, Vishal Bhawan
   95, Nehru Place, New Delhi-19
5. Centre of Science For Villages
   Magan Sangrahalay,
   Kumarappa Road,
   Wardha-442001 (M. S.)
6. CRESSIDA
   Gobinda Auddy Road,
   32 Chaturanga Flat No. 3
   Calcutta-700027 (West Bengal)
7. Dasholi Gram Swarajya Mandal
   Dist-Chamoli
   Gopeshwar-246401 (U P.)
8. Friends of Trees (Bombay)
   Union Cooperative Insurance Bldg; Sir P. M. Road
   Bombay-400023
9. Gram Seva Samiti
   Taronda Nitaya
   Post Office Raisalpur,
   Dist-Hoshangabad-461001
   (M. P.)
10. Gram Vikas
    Mohuda P. O. Narasingpur,
    Via Berhampur-760002
    (Orissa)
11. Himalaya Seva Sangh
    Rajghat, New Delhi- 110002
12. Indian Environmental Society
    Post Box 7033,
    Indraprastha H. P. O,
    New Delhi-110002
13. Kerala Sastra Sahitya Parishad
    Chirakulam Road,
    Trivandrum-59001 (Kerala)





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BAMBOO - The Versatile Tree Grass

By M. S. Hague

ndia is very rich in bamboo resources. With 22 and 136 species, it has one of the largest resources nboos. perhaps next only to China with 26 genera ecies, The areas particularly rich in bamboos are hal Pradesh, Assam, Manipur. Meghalaya, Mizo- agaland, Sikkim, Tripura and West-Bengal. Other ich in bamboos are Andamans, Bastar region of a Pradesh and Western Ghats. A few bamboos are ound in other parls of India both in the hills and ins.

3amboos cover an area of 9.75 million hectares or 12.8% of the total forest area of the country. nual output is estimated at about 3.23 million , which is one-fifth of the country's total wood tion. Nearly 80 paper mills depend wholly or on bamhoos as they are the only long fibred ces easily available to the industries. Bamboos re constitute one of the most important renew- atural resource of the country, but they are not tilized to the maximum. Of nearly 136 species, out 10 are being commercially exploited. They nbus arundinacea, B. balcoa, B. tulda, Dendrc- s hamiltonii, D. strictus. strictus, Ochlances, oa, O. seriptoria and O. travancor.ea, The bamboo ies in India are in their infancy, especially in the afts sector. But India leads the Asian countries utilization of bamboo for paper manufacture. aper industries, bamboo-handicrafts industry also s to be developed to the fullest extent so that os can be used for maximum benefit of the n people.

3amboos vary greatly in size. from small to ng poles as high as 35 metres. They can grow everywhere : from the sea level to the snowlines, er they flourish most in hot, humid forests. In os seeds are rarely available, that is why they opagated through rhizomes, offsets or culm s. In rhizome planting 1-year old culm with re dug up, cut to about a meter high and planted the rainy season. Vegetative propagation of os is an age old method and is practised in Bangladesh and Burma. While planting the pieces, orkers should take extra care not to injure the n of the culm and rhizome. They should be d as soon as possible after being dug.

Irrigation is necessary after planting. Normally takes around 10 years for non-clump forming spec to reach harvesting size, but the time is shorter clump form types.

Most bamboos flower only once in their life-ti and die soon after. Bamboo flowering is mystery scientists. Probably they have an inbuilt alarm clo when it is set to go off at a particular time, all pop lation of a species raised from a single seed sou will start flowering no matter where it is situated. Ev a few months old young shoots will flower along w the old ones. Once population of bamboo, raised fr the same seeds source in Dehra Dun and Calcutta 15 km apart and with totally dlfferent climatic conditio started flowering simultaneously. The flowering cy generally varies from 7 to 120 years.

The succulent shoots of many bamboos are hig nutritious and palatable. Shoots are collected wh they are about 4cm- 7cm long. Shoots of most bambo are edible, however around 26 species are genera used for the purpose.

Research

In the past bamboo research in India was co centrated on Dendrocalamus strictus, because of importance in paper industry. Research is in progr on evolving suitable methods of seed storage, ider fication of bamboos on the basis of culm sheath, clo trials, etc, India now plans to established 3 ma centres of research and development for bamboos : in Assam, one at Dehra Dun, one in Kerala. Previou distant crosses between bamboo and sugarcane w attempted; this is again being considered. The resea on priority basis includes : raising bamboo germpla banks for conservation, breeding high yielding variet propagating bamboo by tissue culture, undertak trials on irrigation and fertilizer application, evolv effective methods of storage, and initiating resea on bamboo culm preservation. Research may also taken up to grasp the techniques of promoting or hibiting flowering to evolve hybrid varieties. Bamb should also be included as on the species in so forestry programmes.

(Abstracted from 'Science Reporter'- Sept. 19

Science & Technology For Women

Under the Sixth Plan, the Ministry of Science & Technology had provided for assistance to researches that would help the women-specially in the rural areas. The scheme known as 'S & T for Women' assisted the following projects to the respective institutions (or individuals) whose names are indicated against them. We have requested the parties to send us a brief account of the work and hope to publish it later :-

1. Impact of female literacy on development of India :- Dr. (Mrs) Kalpana Rohatgi, 174- Madhuvan, Delhi-110092. 2. Assessment of the traditional sickle used by the rural women for harvesting the fields :- Dr. K. N. Shelat, Rural Technology Institute, 2-Floor, C-Block Pantnagar, Yogana Bhwan, Sector-16, Gandhigram Gujrat 3. Introduction of technical systems for women in Sitapur, U. P. :- Shri Varun Vidyarthi, Appropriate Technology Development Association, Gandhi Bhavan, Lucknow, (U. P.) 4. Teaching Women to make solar stills and to grow biodynamic gardens :- Dr. C. V. Seshadri, Shri A. M. M. Murugappa Chettiar Research Centre, Tharamani, Madras-600113. 5. Field Application of an implement to reduce the strain on women in transplantation of paddy seedlings :- Shri M. S. Vittal Rao, Coffee Lands Limited, Saklaspur, Karnataka. 6. Survey and Measures for reduction of drudgery of rural women. Shri Kanu Gandhi, Kasturba Ashram, Rajkot, Gujrat. 7. AICP for alleviation of drudgery in the life of rural women-fuel and cooking aspects :- Prof. Padma Vasudevan, Centre for Rural Development & Appropriate Technology, IIT, Hauz Khas, New Delhi-110016. 8. Science & Technology to reduce the drudgery of rural women :- Ms. Aruna Roy, The Social Work & Research Centre, Tilonia-305812, Rajasthan 9. Scientific stuffed Toy making :- Dr. K, P. Pillai. Lal Bahadur Shastri Engg. & Consultancy Centre, Vellayamblam, Trivandrum, Kerala. 10. Study of cleaning equipment and supplies for work simplification and work effectiveness :- Mrs. Bhargavi Menon, Institute of Home Economics, South Extention, New Delhi-49. 11. A study on socio-economic status of landless labourers in rural areas. :-Dr. (Smt) Nisha Sharma, Mahila Degree College, Lucknow, (U. P.), 12. Additional Sciences based training activities for women :- Dr. K. P. P. Pillai, LBSERC, Sasthamanglam, Trivandrum, Kerala.

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in any sphere-whether in the Art or
the Sciences-depends upon the creative
freedom allowed to the individual. For
freedom allows latent talent to express
itself-to explore new dimensions of
thought and action, unfettered by the constraints of
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Waste Into Wealth

By

(Dr. H. C. Visvesvaraya, Chairman, Cement Research Institute of India)

Waste : Exact estimates of the agricultural wastes such as wheat straw, paddy straw, sorghum sticks, rice husk, cashew apples and so on, produced today, are not available as there is no organized data, our estimates made about their total availabity in India is about 300 millon tonnes every year.

Industrial and mineral wastes such as flyash, blast furnace slag, lime sludge, red mud and so on are generally from more organized sector and the data available indicate that about 50 million tonnes of these wastes are available every year in our country.

In regard to urban and rural wastes such as sweepings, garbage, kitchen wastes, night soil, animal wastes etc. even though it is known that man is the largest producer of wastes generated, very little organized data is available. However the total availability of these wastes in India is estimated to be over 1,000 million tonnes every year.

Building Materials : Flyash, whose present annual availability is estimated to be over 18 million tonnes is perhaps one of the most extensively talked of industrial wastes; considerable amount of research and development work has been done in regard to the utilisation of flyash and still perhaps this is a material which is yet to find a large usage in practice, possibly because all the aspects relating to the wastes management as a whole have not been fully taken into account so far. This is the reason why organisations like CBRI have been engaged in finding workable methods of clay flyash bricks and organisations like CRI, in finding methods of manufacturing flyash blocks by utilizing the flyash on an as-is-where-is basis. Although areas such as light weight aggregates and aerated concerete blocks have been given some attention, there is still a long way before they become practical realities.

Nearly 7.5 million tonnes of blast furnace slag becomes available from our steel plants every year, but a little less than 2.5 million tonnes out of it is granulated. Granulated slag has been successfully used in the production of cement and indeed it is now accepted that each tonne of clinker can give about 2.1 tonnes of slag cement as against only 1.05 tonnes of ordinary portland cement when it is ensured that both the clinker and the slag are of appropriate qualities. In spite of this appreciation, the fact that nearly 5 million tonnes of slag is not made full use of, is because of the difficulties expressed in the granulation of the entire quantity of slag by our steel plants. There was a time when steel producers would say that they are required to produce steel and not slag and so those who wanted slag should take whatever comes out; but now there is a realization that in the total national context, attention to the by-product or the waste product also is necessary. Low carbon ferro-crome slags from other metallurgical plants can also be used in the manufacture of slag cements under certain controls and they could also be used for autoclaved building blocks and such other building materials.

Close to 5 million tonnes of by-product gypsum is available annually from our chemical industries This by- product is becoming a valuable resource, specially in the context of the depleting reserves of good quality natural gypsum. Substitution of natural gypsm by by-product gypsum in the manufacture of alternate building materials such as gypsum plasters, have to be constantly kept in mind.

Considerable quantities of dust is emitted from the kiln stacks and with the tighter controls on emission of dust to the atmosphere, increasingly larger quantities of dust are being collected. It is estimated that about 2 million tonnes of dust is collected annually which could be recycled in the process of manufacture of cement itself.

Considerable work has been done to develop appropriate technologies for the production of building materials from agricultural wastes. The very characteristics, such as possessing a ligneous fiber structure, in some of the agricultural waste which make them unattractive as fertilizer and feeds make them well suited for building materials such as in the manufacture of roofing panels, wall and partition panels and building blocks. it is also reported that strained-pasty-liquor obtained by boiling banana wastes provide adequate water proofing to the clay and fibre walls in Low Cost Housing Schemes. ▣

points to ponder

Increasing Greenhouse Effect :

Rising levels of trace gases in the atmosphere are increasing the 'greenhouse effect', says Lawrence Berkeley Laboratory Scientist Harold Johnson.

The greenhouse effect is the phenomenon by which atmospheric gases prevent heat radiated off the planet's surface from escaping into outer space. Fears about an escalating greenhouse effect altering the planet's climate have focused on atmospheric carbon dioxide. According to Johnson, the calculated increase in the earth's temperature due to the increase in the earth's temperature due to the increase of these trace gases over the last 10 years is as much as 70 percent due to carbon dioxide.

'As far as the ozone layer is concerned, there are some cancellations between the effects of increasing the amounts of these gases in the atmosphere so that the net effect on ozone is close to zero. But such increases all move in one direction on the greenhouse effect -all act to raise surface temperatures,' he says.

The situation bears close watching, he says, and any substance with a strong infrared absorption coefficient, such as methane, nitrous oxides and chlorofluoro carbons, can be readily provided in troublesome amounts by human activity.

(DOE this month-June 1985)

Foreign Aid 'Disables'

John Tinker, director of the London-based Earthscan group says that the misdirected foreign aid policies pursued by developed nations,combined with the short-sighted priorities of the Governments had pushed third world countries to the brink of 'environmental bankruptcy' is specially evident in Africa. Over cultivation, deforestation and overgrazing have ruined the sponge effect of the soils there. Millions susceptible to be killed by droughts and equally disastrous flash floods. Mr. Tinker said that sub-saharan Africa was on the verge of environmental collapse from deforestation, soil erosion and pollution as countries are pushed to their limits to pay off foreign debts often by growing inappropriate cash crops for export

What could a Woodstove Save ?

Some one billion cubic meters of wood and other biomass are burned annually for cooking-- the energy equivalent of two billion barrels of oil. This is the primary energy source for half the world's people, but it is rapidly disappearing as forests are cleared for agriculture or cut for commercial timber and to a lesser extent, used for fuel.

In response to the growing fuelwood shortage, donors are spending about 100 million per year. Yet more needs to be done. For example, in India alone, the nutrient equivalent of one-third of the chemical fertilizer used is now wasted by burning cowdung as a substitute for wood. Improved stoves can play a major role in meeting this crisis,

Providing each of the 350 million rural households in eveloping countries with a $5 set of stoves would cost about $1. 75 billion. This is roughly the cost of one nuclear power plant in the United States. Each year the stoves would save 10-20 times as much energy as the nuclear power plant would produce in its entire lifetime.

(VITA news, Jan. 85)

Drought

In 1983, at least 300 million people were reported affected by drought in various parts of the world. This outnumbered in only one year, the known drought victims of the whole decade of the 1970s and it was almost double the number in the 1960s. A similar trend was noted in floods, which also occurred on an unprecendented scale on 1983. Even disasters triggered by high winds, earth-quakes and other natural hazards are increasing, as are wars and armed conflicts.

(Asian-Pacific Environment-March' 85)

राष्ट्रीय प्रयोगशालाओं को
गरीब की झोपडी से
जोडनेवाली हिन्दी की
द्वैमासिक पत्रिका

ग्रामोपयोगी विज्ञान

हमारी राष्ट्ररूपी श्रंखला की सबसे कमजोर कडी है हमारे गांव। जंजीर की मजबूती उसकी बससे कमजोर कडी में होती है। आइए, इस कडी को दृढ बनाने में हमारी सहयोग करें– 'ग्रामोपयोगी विज्ञान' पढकर।

वार्षिक चंदा
व्यक्तिगत : रु. ५ /–
संस्थागत : रु. १० /–

संपर्क करें : ग्रामोपयोगी विज्ञान
केंद्र, मगन संग्रहालय,
वर्धा-४४२००१, महाराष्ट्र.

WINDOW TO THE WORLD

The Metallic Affinity of Coir Dust

Water pollution and the resultant death of aquatic life are causing increasing concern round the world. The major pollutants are the industrial and mining wastes which contain toxic heavy metal ions such as calcium, nickel, zinc, copper, lead, cadmium and magnesium. The high cost involved in treating these toxic wastes to reduce pollution often prohibit the involved industries from attempting it. A low-cost method to reduce or even eliminate the toxicity of these wastes have been found out.

The Forest Products Research and Development Institute of the Philippines has found out that coconut coir dust can be used to remove heavy metal-ions like copper, zinc, etc. from industrial and mining wastes.

One hour treatment by either soaking or shaking the coir dust in the aqueous solutions was sufficent to remove almost totally (99.7 percent) the Zinc-ions in the test solution. With cooper-ions, the maximum amount removed was 92.30 percent after agitating for five hours. Calcium and copper-ions also showed varying affinities to coir dust, while the ferric-ions had the poorest affinity.

(Tech.Monitor Nov.-Dec. 1984)

Fuel Briquettes

A new briquette press built on the results of an earlier design of a press to convert agricultural and other fibrous residues into low cost fiberboard building panels has been made.

With simplicity and minimum cost in mind, the research team created a mold from a section of thick-walled plastic pipe that had an inside diameter of the desired 150 mm. Holes were drilled in the sides of the pipe to allow the escape of water from the fiber plug under the pressures of the ram. The mold consists of three parts; the 250 mm-long (10 in.) plastic pipe with an inside diameter of about 150 mm (6 in.); a slotted — or perforated — wood-base (for drainage) to which a 50 mm (about 2 in.) center rod, pipe, or dowel is attached that is about the same length as the pipe section (250 mm); and a wood plunger with a circular base and a hole in the center that fits easily over the center dowel.

The fuel value of wood species is between 8,000 and 8,500 BTUs per pound. For agricultural residues, it ranges from about 6,500 to 10,000 BTUs per pound.

The most efficient use of the briquettes is to burn them in a stove designed for that purpose. A prototype stove is designed for that purpose. A one-pound briquette burned in this stove produced useful cooking heat for about two hours. (Vita news Jan.85)

What is 'Kuntan'

All over the world, farmers discard thousands of rice cereal husks. There's nothing the husks are good for, they say. From Japan comes a new technology to turn these "Worthless" husks into a low-cost, highly effective way to combat one of the most devastating trends in world agriculture the desertification of hundreds of thousands of acres of arable land. The Japanese technique is to bake the left over husks into a carbonized substance called 'kuntan', The kuntan is then baked in a nickel chromium plate, producing a sponge-like material with a remarkable water absorption and retaining capacity easily absorbing sunlight and air to nourish plant roots. The cost is surprisingly low. A thousand square meters of farmland can be treated with 300 kilograms of rice husks for less than U. S. Doller one. "And low cost", concludes one of kuntan's developers, "is one of the major attractions of this effort when you consider that many deserts are in poor, underdeveloped countries ".

A Shift In The Wind (USA)
17 Dec. '84

Rainwater Harvesting

The ideas is simple. "Catch the rainfall before it evaporates, then use it to water the crops." "Few people today practice this ancient commonsense technique for securing supplies of the life-sustaining resources. In Washington however, scientists at the Water and Sanitation for Health Project (WASH) hope to build an exchange information network that reveals the various ways different people around the World save rainfall for their water needs.

WASH Coordination and Information Center Librarian Dan Campbell says that the AID sponsored group wants data on every type of system from roof rainwater catchement tanks used in Africa to descriptions of artificial hillside catchment systems used in the Caribbean. He notes that 50 to 60 percent of rainfall can be collected and saved from evaportation even in arid or semi-arid regions. Campbell argues that this ancient resource-saving technique needs to be popularized. He notes that most systems are very inexpensive and easy to construct. Certain types of appropriate technology, such as paving the catchment surface, can further raise the yield.

Wash is currently conducting a world-wide survey of Organizations working to foster rainwater hervesting projects. Readers from institutions working in rainwater harvesting can to write to: Dan Campbell, 1611 North Kent Street, Room 1002, Arlington, Virginia 22209, U.S.A.

Science For Villages
1985 July.WDA-119

CSV at Work

Tree Plantation Project :

A detailed fuel energy survey of village 'Karla' near Wardha was carried out under 'All India Co-ordinated project for alleviation of drudgery in the life of rural women- Fuel and cooking aspects. The findings of the survey indicates a sudden shift in fuel pattern from wood fuel to agrowastes reflecting the direct effect of deforestation. out of the 70 families of this village, 30% do not use wood as main fuel, 52% use it as supplementary fuel. For the family of five daily consumption of cotton stalk and stalks of pegeon pea is 2.4 kg respectively. Ladies and especially young girls who are mainly engaged in fuel collection have to walk about 1.1 to 2 kms and spend nearly 17.5 hours per week. The idea of growing fuel plantation near the Village was very much appreciated by the women folks who are the real sufferers. As a part of this programme nearly 2 hect. of land on a barren hillock near the village is being brought under the fuel tree plantation by planting about 2000 trees of different plant species. Under this programme an attempt is being made to study and compare the biomass growth in case of indigenous plant species as against exotic species like eucalyptus and subabul. The soil will also be tested annually to note the effect of plantation on the soil quality.

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Green Vegetable Project

Most of our rural population and especially the children and women suffer from malnutrition owing to deficiencies of Vit. A, Iron and protein. Green vegetables are rich sources of Vitamins and minerals. A project entitled optimization of courtyard garden to combat malnutrition in rural families, has been undertaken.

The basic objective of the project is to optimise the systems of cultivation of green vegetables with the limited availability of space and water and then to demonstrate the application of these systems in the selected few poor families. Under this project, a nutrition survey of around 150 families in Wardha with varied economic and social conditions was carried and the data collected is being analysed.

Vegetable gardening by biodynamic raised bed method is under trial. Kitchen garden on the roof top, in shallow bamboo baskets is also being carried on in some houses. The recent introduction is a new mode of watering by drip irrigation with emmitters, in one plot of green vegetables. The data on vegetable Production under various sets of experiments is being collected.

Training course in Rural Technologies

Taknikipura, the experimental campus of CSV at Dattapur is now buzzing with training activities, under a project sponsored by Council for Advancement of Rural Technology. The 28 trainees who have joined this short term training course in five rural Technologies are busy with technical lessons, field trials and discussion in the respective subjects they have chosen. A major section of them have opted for Bio-gas training programme numbering ten, followed by seven in non-wheel pottery course, five in compost making, three in Board and paper making from Banan stem pulp and three in rural housing. These young and enthusiastic trainees are from seven states of India- Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Rajasthan, Kerala and Uttar Pradesh. The course which commenced from 2nd May will finish by the end of July. *The voluntary agencies wanting to send candidates for the next session that will start from 1st September, 1985 are requested to send applications by August Second Week to Director CSV, Magan sangrahalaya, Wardha-442 001.*

BOOK-POST/PRINTED MATTER

EDITOR
CFTRI NEWS LETTER
CENTRAL FOOD TECHNOLOGICAL
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MYSORE - 570013
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Printed and published by Devedra Kumar on [illegible]
Devendra Kumar, Managing Editor : Rajiv Gupta, Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha,442001,Printed at Samyayog Press, Wardha.

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ALLEVIATING POVERTY

India is not only having a very large percentage of people living below the level of subsistance as per our own (and not world) standards – the figure being between 40 and 50, but it is a tragic travesty of circumstances, where being among the ten industrially developed and technologically equipped nations of the world it is also among the poorest ten. The disparity ratio in the income and property of the population as counted by standard measures stands amongst the highest in the Third World countries. Pledged as we are to a more egalitarian structure for removal of poverty from our land, a very thorough X-ray should be made to find out the malady that is sapping our efforts towards a socialistic society.

We have to work from below and see that the weakest link in the economic chain is strength with prime priority. The Integrated Rural Development programme initiated in 1975 was to make a search of such a path in 20-21 selected districts of the country which had been identified as the poorest and most backward one in each State. The work could hardly proceed when in 1977-78 the scheme without having found its moorings was sought to be applied to all the districts of the country and thus became totally diluted and meaningless except that it enabled an intensive enumeration of BPL (Below Poverty Line) population. We must accept that none of us have been able to get the answer to the grave and great problems of poverty. It requires an integrated approach in which all the tools that we have and experiences and talents we possess are to be geared. Rural poor have been the target group since 1937-38 when the first responsible governments at state level were formed during British days. Numerous innovative experimentations have gone in during the last half century since then. The Gandhi movement or what could be called villagism, the socialistic pattern of the technological revolution, the micro level innovative efforts of various voluntary agencies independently seeking for a workable model that could be replicated. All these and many more have thrown up some plus and many minus experiences. So what we strive to find out now is not on a clean slate but on the historical experience of 50 years of national endeavours.

More and more new occupations that are not landbased should be introduced in the village. They will be engaged in the processing of the raw materials available in the village. A 1000 rural industries should be developed through the inputs of science and technology suitable for the villages. The average no. of days that a village keeps himself economically occupied productively is decreasing with time. If it was 250 days in 1900 it is 180 now. Agriculture by itself is not in a position to employ the increasing number and fulfilling the optimum needs of the village. Otherwise too the raw material producers are always going to be on the losing end of the game vis a vis the consumer goods Producers. The industrialisation of the villages is a must for removing rural poverty as well as the deficit gap between the rural-urban economies. The Three Gaps – Affluent & Third World, Urban and Rural and the Rich and Poor in general must not be allowed to widen, which they do when competitively more efficient production is done through more capital intensive sophisticated technologies which unfortunately are also ecologically degrading. The Appropriate technology is one that is environmentally sound and leads to Social justice. We have to use all our knowledge of S & T, evolve such technologies and on the basis of that create new trades and professions for the villages. Since the BPL need to be provided with more

(Cont. on page 32)

from the labs

The Mosquito Eating Bug : A water bug, commonly found in permanent water bodies and paddy fields, holds promise as a potential biological agent for eradicating mosquito larvae. The bug (Diplonyxhua Indicus) feeds voraciously on the larvae of malarial mosquito (Anopheles s. p.) as also on the other species of Culex and Aedes that transmit filariasis and dengue fever, according to Dr. P. venkatesan, assistant professor of Zoology, Loyola college, Madras.

Measuring about a centimetre in length, the dirty brown bugs mostly inhabit stagnant waters-rain water pools, reservoirs, ponds, wells and rice fields, and they are seen attached to aquatic plants. They are poly phagus in nature, and in the absence of other feed turn cannibalistic, according to the scientists.

The sturdy water bugs have wide adaptability and they can even survive in esturarine waters. They are migratory in nature and are attracted to light. Usually, the male bugs are seen carrying rows of eggs on their back. "This water bug is not a crop pest and also not a nuisance to public" says the scientist.

(Source : The Hindu, July 8, 1985.)

Snake Bite Antidote : In a snake infested rural area where medical aid is far away, as an immediate remedy the fresh juice of the root or the whole dry plant of Neeli (**Indigofera Tinctorial**) may be given. In the history of toxicology, Neeli is the first drug scientifically proved to be effective orally in Cobra envonomation (The Hindu, August 10, 1984.) Preliminary studies with Saw Scaled and Russell's viper venoms are also encouraging. As krat venom is essentially a neurotoxin like that of Cobra the drug may also be useful in such a snake bite. The other drug scientifically reported with capacity to antagonise Cobra neurotoxin are Vasambu (**Acorus Calamus**) and two plants from the polygala species. Sidda texts clearly tell that Neeli and Vasambu are useful in snake and other types of poisonings.

From experiments conducted with Neeli it is inferred that by using this drug, nearly 40 per cent of Cobra bite victims can be saved. In the rest of the victims it will postpone death by nearly 2-1/2 hours. If this 2-1/2 hours is added to the usual time it will take for a bite before it is fatal, one can deduce that this drug will give a safe interval for the victim to be brought to a nearby hospital for further intensive treatment as the condition warrants. Anyhow at this stage whether one is given this remedy or not the victim should be brought to a nearby hospital equipped with antivenine serum, with usual first aids and precautions.

(Source : The Hindu, July 28, 1985.)

Potable water Through Desalination Plants : In the application of electrodialysis for converting salt water into potable water. Desalination plants designed and built by the Central Salt And Marine Chemicals Research Institute, Bhavnagar have started supplying drinking water to Nochivayal villages in the Rammad district of Tamilnadu, and Adalsar village in the Surendr Nagar district of Gujarat.

The plants are capable of giving 30,000 litres of potable water a day, at the rate of approximately ten literes per individual of the village.

The estimated cost of setting up a plant is about five rupees per litre capacity of the tank, the operating cost is about five rupees per cubic metre of water supplied.

(The Hitavada, June 29, 1985.)

Thatched roof with longer life : A process evolved by four scientists of the Regional Research Laboratory, Trivandrum, for processing coconut palm leaves will be a boon to owners of thatched huts. The new process makes the leaves withstand the rigours of the weather for four to five years. The process is simple and relatively inexpensive. The plaited leaves are dipped in a weak solution of copper sulphate for a few minutes and left to dry, later cashew oil (obtained while roasting cashew-nut) is sprayed or applied on the leaves which are again dried. The chemical treatment costs Rs. 40 to Rs. 50 per 100 leaves.

(The Times of India, Aug 15, 1985)

GANDHI ON DEVELOPMENT

Village Industries

Given the willing cooperation of the masses of India, this country can notonly drive out shortage of food, but can provide India with more than enough. This organic manure ever enriches, never impoverishes the soil. The daily waste judiciously composted, returns to the soil in the form of golden manure causing a saving of millions of rupees and increasing manifold, the total yield of grains and pulses. In addition, the judicious use of waste keeps the surroundings clean. And cleanliness is not only next to godliness, it promotes health.
(Harijan, 28-12-1947)

Natural Food

palm jaggery can be converted into molasses and refined sugar. But salts present in the jaggery are lost in the process of refining. just as refined wheat flour and polished rice lose some of their nutritive value because of the loss of the pericarp, refined sugar also loses some of the nutritive value of the jaggery. One may generalize that all foodstuffs are richer if taken in their natural state as far as possible. (Key to Health, pp. 33-34, Edn. 1956)

Revival of The spinning wheel

I... claim for the 'charkha' the honour of being able to solve the problem of economic distress in a most natural, simple, unexpensive and businesslike manner. The Charkha, therefore, is not useless... but it is a useful and indispensable article for every home, It is the symbol of the nation's prosperity and, therefore, freedom. It is a symbol not of commercial war but of commercial peace. It bears not a message of ill-will towards the nations of the earth but of good-will and self-help. It will not need the protection of a navy threatening a world's peace and exploiting its sources, but it needs the religious determination of millions to spin their yarn in their own homes as today they cook their food in their own homes. I may deserve the curses of posterity for many mistakes of omission and commission, but I am confident of earning its blessings for suggesting a revival of the charkha. I stake my all on it.

Human Resource

Mechanization is good when the hands are too few for the work intended to be accomplished. It is an evil when there are more hands than required for the work, as is the case in India. . . . The problem with us is not how to find leisure for the teeming millions inhabiting our villages. The problem is how to utilize their idle hours, which are equal to the working days of six months in the year.

Though articles may be manufactured by villagers in their cottages, they can be pooled together and profits divided. The villagers may work under supervision and according to plan, raw material may be supplied from common stock. If the will to co-operative effort is created, there is sure ample opportunity for co-operation, division of labour, saving of time and efficiency of work.

Rural Employment

I have no partiality for return to the primitive method of grinding and husking for the sake of them. I suggest the return, because there is no other way of giving employment to the millions of villagers who are living in idleness. In my opinion, village uplift is impossible, unless we solve the pressing economic distress. Therefore, to induce the villagers to utilize their idle hours, is in itself solid uplift work.
(Harijan, 30.11.1934.)

To the Scientists of India —

"I would like you to be men who stand up before the world firm in your convictions. Let your zeal for the dumb millions, be not stifled in the search for wealth. I tell you, you can devise a far greater wireless instrument which does not require external research but internal – and all research will be useless if it is not allied to internal research which can link your hearts with those of the millions. Unless all the discoveries that you make have the welfare of the poor as the end in view, all your workshops will be really no better than Satan's workshops.

Gandhiji

(13.7.27)

FOOD OR DRUG ? – A DILEMMA

Dr. C. V. Seshadri

Sugar vs. 'Gur' :

India is the largest sugar producing country and has the largest area undercane. For example the area under cane was 3.19×10^6 hectares, the sugar produced was 8.4×10^6 tonnes and molasses produced was 3.9×10^6 tonnes in 1981–1982. Traditionally, India, the home of sugar or **Sarkara** (Sanskrit) has had two ways of refining cane juice to make a sweet solid product, a) make open pan sugar or **Khandsari** with some **khandsari** molasses to accompany it or, b) make jaggery or **'gur'** (Hindi) which is just solidified cane juice. The modern sugar factories with their huge crushers and evaporators are steadily replacing the traditional processes. Today the sugar industry is one of the largest in the country, being next only to iron and steel and cement in size, if one does not count the petroleum refining complexes. As recently as 1977 the percentage of traditional sugar to all sugar was 56% today it has steadily decreased to 40% or less in terms of cane usage. The advantages of the traditional sugar processing to modern (white) sugar can be seen in terms of the nutritional value of 'gur' :

As can be found from the Nutritional Table, the traditional sugars contain more of vitamins, iron, calcium, and phosphorus than refined white sugar. Even molasses is much richer in vitamins than white sugar. White sugar is a table, that has only been acquired recently in the poorer countries of the world. As a famous physician (Norris, 1975) once said : 'Much of our present dietary arises from the fact that 200 years ago man learned how to isolate sugar. . .' and he goes on to add why he thinks it is harmful. In India, sugar has been isolated for millenia but not isolated enough that the vitamins and minerals were removed. Hence, 'gur'.

Especially in countries where pre–natal and neo–natal anaemia are very common due to other sources of under–nutrition, sugar cane, unrefined, is a very valuable source of easily assimilable iron and vitamins. The Government of India is considering massive programmes of synthetic augmentation of iron and vitamins for young children and vitamins for young children and women. 'Gur' and molasses are natural sources. However it must be pointed out that the traditional village industry of solidifying cane juice has some draw backs which hamper its efficiency ; 1) the furnaces are inefficient hence fual efficiency is low, 2) the product has low shelf life because of residual proteins and its hydrosscopic nature leads to bioconversion. New types of evaporators seem to be an urgent need. To prolong the shelf life and prevent inversion of sucrose, enzyme and bacterial action should be reduced These are problems for the research scientists that might pay dividends.

Alcohol vs. Yeast :

In a tropical country, it befits a state with the welfare of its people at heart to use its carbohydrate resource to the maximum benefit. To use it to make alcohol which can really bear any amount of taxburden because of peoples 'addiction, and hence justify the states' expanding exchequer is to beg the question of proper, alternate and perhaps better use.

Table below shows the increasing percentage of potable liquor based on the total industrial alcohol output of the country since 1976.

Table 2 : Alcohol consumption profile (in million litres)

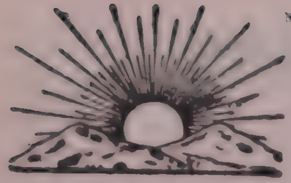
Year	Total consumption (A)	Industrial (B)	Potable (C)	% C
1976-77	445.0	276.6	169.4	38
1977-78	459 2	284 0	175.2	38
1978-79	530.0	348.4	181.6	34
1979-80	389.5	277.0	162.5	4
1980-81	417.2	209.3	207.9	4
1981-82	506.2	252.2	254.0	5
1982-83	537.8	251.6	286.2	5

Source.: All-India Distiller's Association, N
Delhi – 110019, India, Report of t
Working Group 1984.

In Tamil Nadu, alone the Government makes about 500 million rupees annually in licensing shops for Arrack, a spirituous drink. The large-scale diversion of molasses for this purpose cannot but have serious consequences on long-term health of the population. As Justice Krishna Iyer, a retired judge puts it : "I beg the government not to practice organic chemistry on innocent addicts." The large scale industrial rectification of alcohol is made possible by large cane – sugar factories and subsequent molasses availability.

Hence, however, two alternate microbial processes for molasses, one for the people's welfare and the other for the people's ill fare. Which one has the more value – the answer is obviously alcohol. However the hidden costs lie in bad health, and all the other problems associated with alcoholism. The equivalent production of yeast corresponding to 60×10^6 litres of potable alcohol used in Tamil Nadu every year will be 75×10^6. This can feed at 10 gm/day and 300 days/year, 25,000,000 children all their vitamins.

Thus we arrive at a modern impasse ! Technological imperatives may lead you to emphasise the wrong value system. *



THOREAU – HIS VISION

Bob Glaberson

Henry David Thoreau, who lived between 1817 and 1862 was an essayist, philosopher and naturalist, lived the whole of his short life at Concord, Massachusetts, USA.

What Thoreau had to say was of great importance for people in the present day peace, labour and ecology movements. He was ahead of his time. He foresaw that the struggles ahead would involve freeing our selves from consumerism and the mis-uses of technology. He foresaw that future goals for the human race would probably include meaningful and enjoyable work, not just well-paid work, and sufficient leisure to develop the personality. Thoreau was not opposed to improvements in industry and technology, he merely wanted them to be put to better use :

> "With a little more wit, we might use these materials so as to become richer than the richest are now, and make our civilisation a blessing."

By "richer" he meant in a spiritual, aesthetic and material sense, not just in a material sense. Due to the rise of industrial capitalism our world had become less and less spiritual, more and more materialistic Let us take stock of our lives, Thoreau says. We strive to possess, to conquer and to achieve. But in all of this we are concerned only with the outer world, the struggle with nature and with other people for material gain. Like Words Worth, Thoreau believed that "getting and spending, we lay waste our powers." People understand a great deal about their external environment, but very little about their inner selves – their inner potentialities. Yet the exploitation of our untapped human potentials has become increasingly important in a world where there are growing rational limits on the exploitation of the external environment.

We have made the industrialised world materially comfortable for most people. Now let's make the world humanly habitable. I believe that Thoreau's ideas are increasingly important for us to consider, because capitalism has already raised people's expectations of what they can achieve and obtain, it may be that in the west it is capable of satisfying most people's expectations of what they can achieve and obtain. It may be that in the west, it is capable of satisfying most people's material needs for the forseable future. Even the struggle for jobs is beginning to take on the character of desire for more meaningful work and leisure. On the other hand, in my view there are some things that industrialism – either east or west – is either unwilling or unable to provide. One of these is peace; others are a world of human values and self-development. In fact, the values and direction of industrialism are increasingly in opposition to these goals. I feel that no opposition movement will stand much of a chance unless it strikes at the very root of the system : the philosophical and moral basis of society, at consumerism, conformity, competitiveness and egoistic individualism. Leading the way a hundred and fifty years ago in calling for a moral and intellectual liberation of the people :

> "Moral reform is the effort to throw off sleep . . . the millions are awake enough for physical labour ; but only one in a million is awake enough for effective intellectual exertion, only one in a hundred million to a poetic or divine life. To be awake is to be alive." — Thoreau

We need to change our values. Being afraid of the bomb or destruction of the environment isn't a change of values. What Thoreau taught each day grows more relevant ; in order to change the world we must reshape it according to a different model. Erich Fromm echoes Thoreau and says that we will have to find a new way of living, to enjoy just being in the world and not to feel we must have more in order to live. ☆☆

गरीब की झोपडी और राष्ट्र की आधुनिक
विज्ञान-प्रयोग शालाओं के बीच सेतु का
काम करनेवाली हिन्दी की पहली पत्रिका –

ग्रामोपयोगी विज्ञान

वार्षिक शुल्क : ५ रूपये (व्यक्तिगत) १० रूपये (संस्थागत)
पता : ग्रामोपयोगी विज्ञान केन्द्र, मगन संग्रहालय, वर्धा ४४२००१ (महाराष्ट्र)

BEYOND PRETTY TREES & TIGERS

ANIL AGARWAL

It looks as if environment is an idea whose time has come. In the last four years, some 1,000 crore seedlings are said to have been distributed or planted. There are new laws for control of air and water pollution and for the conservation of forests. Plan documents manifestoes are equally careful to mention the importance of environment.

But there is a major problem with this entire range of activities and concerns : it does not appear to be based on a holistic understanding of the relationship between environment and the development process taking place in this country. There is little effort to modify the development process in a manner that will bring it in greater harmony with the needs of the people and with the need to maintain ecological balance, while increasing the productivity of our land, water and forest resources.

To understand the nature of the environmental problems in India, it may be useful to compare and contrast certain environmental trends and concerns in India with those in the West. Third World today faces both an environment crisis and a development crisis, and both these crisis seem to be intensifying and interacting to reinforce each other. On the one hand, there does not seem to be any end to the problems of inequality, poverty and unemployment, the crucial problems that the development process is meant to solve. On the other, environmental destruction has grown further apace.

Very simply speaking, the major environmental problems in the West are those arising out of waste disposal problems of air and water pollution and of disposal of highly toxic, industrial and nuclear wastes. Though problems of acid rain have definitely increased and there does not yet seem to be any solution to the problem of toxic wastes, it is true that some cities and rivers do look cleaner.

In the Third World, however, as its own industrialization proceeds, these water disposal problems are getting worse day by day but they are still not the major or only environmental problems. In the third World, the major environmental problemes are clearly those which arise out of the misuse of the natural resource base – out of the misuse of soils forests and water resources. These problems are created to a great extent because of the pressure to produce raw materials for modern industry. The Third World's environment not only provides raw materials for its own industries but also for the industries of the West.

The pattern of environmental exploitation that we see on the global scale simply reproduces itself on the national scale. Exactly what the Western industry does to the Third World environment, the Indian industry does to the Indian environment. Nearly half the industrial output in India is accounted for by indurstries which can be called biomass-based industries: that is, industries like cotton textiles, rayon, paper, plywood, rubber, soap, sugar, tobacco, jute, chocolate, food processing and packaging and so on. Each of these industries exerts an enormous pressure on the country's cultivated and forest lands. They need crop lands, they need forests, and they need energy and irrigation.

The first lesson is, therefore, clear: the main source of environmental destruction in the world is the demand for natural resources generated by the consumption of the rich (whether they are rich nations or rich individuals and groups within nations) and because of their gargantuan appetite, it is their wastes mainly that contribute to the global pollution load.

The second lesson, however, is that it is the poor that are affected, the most by environmental destruction, The field experience of voluntary groups shows clearly that eradication of poverty in a country like India is simply not possible without the rational management of our environment and that conversely environmental destruction will only intensify poverty. The reason is simple though seldom recognized. The vast majority of the rural house holds meet their daily household needs through biomass of biomass-related products, which are mostly collected freely from the immediate environment. In short, they live within nothing other than a biomass-based subsistence economy. Food, fuel (that is, firewood, cowdung, crop wastes), fodder, fertilizer (that is organic manure, forest litter, leaf mulch), building materials (that is, poles, thatch), herbs and clothing are all biomass products. water is another crucial product for survival whose availability is closely related to the level of biomass, available in the surrounding environment. Once the forest disappears, the local pond silts up, the village well dries up, and the perennial stream gets reduced to a seasonal one. The water balance gets totally upset with the destruction of vegetation ; in a monsoonal climate like ours with highly uneven rainfall over the year, it means greatly increased run off and floods during the peak water season and greatly increased drought and water scarcity in the lean dry season.

The magnitude of India's dependence on biomass for meeting crucial household needs can be appreciated by looking at the energy situation. We as Indians love to point out that India has the world's tenth largest industrial output, or something like that. But even then over 50 per cent of the fuel consumption in India is for such a fundamental activity for survival as cooking. In developed countries, cooking consumes less than 10 percent of total national fuel consumption.

But even more important for India is the fact that over 90 percent of the cooking fuel in India is biomass : that is, firewood, cowdung and crop wastes. Even urban households are heavily dependent on firewood as fuel. Few people, energy planners and government officials alike, had any idea until recently of the dimensions of the rural-urban fuelwood trade. Annual urban purchase of fuelwood are well over Rs. 500 crores in India. When the effective heat provided by firewood is compared to kerosene, because of the low efficiency chulhas in which firewood is used, firewood becomes four to five times more expensive than kerosene. LPG, incidentally, a fuel used by the richest sections of the society and supplied entirely by government sources, is the most convenient and cheapest fuel available.

In the Bhandara and Chandrapur districts of Maharashtra nearly 70,000 mat and basket weavers have been protesting against the discriminatory prices and small quota of bamboos given to them whereas big paper mills have been leased out large bamboo forests. Bamboo is available to paper mills at Rs. 15 a tonne, it is available to basket weavers and other small bamboo users in the market at Rs. 1,200 per tonne.

Fodder is another vital resource that is in acute shortage. With only 2.45 percent of the world's land mass India supports 15 percent of its cattle, 52 percent of its buffaloes, and 15 percent of its goats, and these animals play an extremely important role in the integrated system of agriculture and animal husbandry that Indian farmers practice. Shortage of fodder, especially from public lands, means, as a study from the tribal areas of Gujarat shows, that poor landless households and marginal farmers do not benefit much from the milk cooperatives and animal improvement schemes in the region.

In such a situation where millions of people are heavily dependent on biomass sources for their daily existence, the destruction of the environment or any policy that reduces access to biomass resources like the proposed forest bill will have an extremely adverse impact on the daily lives of the people.

There are two major pressures operating on the country's natural resources today. The first, generated by population growth and thus by increased household demand for biomass resources, has been widely talked about. The poor often get blamed for the destruction of the environment. But the second set of pressures, generated by modernization, industrialization and the general penetration of the cash economy, are seldom talked about even in policy making circles.

Modernization affects nature in two ways. Firstly, it is extremely destructive on the enviroment in its search for cheap biomass-based new materials and in its search for cheap opportunities for waste disposal.

Other than the destruction of the environment, modernization affects nature in yet another way ; this is by steadily transforming the very character of nature. In physical terms, the tendency is to reduce the diversity in nature and transform it into a nature that is full of high-yielding monocultures. The ecological role of the original nature is also usually disregarded in this transformation. In social terms, the transformation is generally away from a nature that has traditionally come to support household and community needs and towards a nature that is geared to meet urban and industrial needs, a nature that is essentially cash generating. Excellent examples of such transformations are the pine forests in place of the old oak forests in the Himalayas, the teak forests in place of the sal forests in the Chottanagpur.

Now, if in the name of economic development, any human activity results in the destruction of an ecological space or in its transformation which benefits the more powerful groups in society, then inevitably those who were earlier dependent on that space will suffer. Development in this case leads to displacement and dispossession and will inevitably raise questions of social injustice and conflict.

Thus what we see in India today is a growing conflict over the use of natural resources and, in particular, over biomass between the two sectors of the country's economy ; the cash economy or the modern sector on the one hand and the non-monetized, biomass-based subsistence economy, the traditional sector on the other.

As the growing stock of biomass goes down, the demand for biomass from the cash economy goes up and demand begins to exceed supply, and pressure to exploit the remaining biomass increases enormously, biomass prices rise, and destructive processes accelerate because of sheer market forces.

The destruction of the environment clearly poses the biggest threat to marginal cultures and occupations like that of tribals, nomads and fisherfolk which have always been heavily dependent on their immediate environment for their survival. But the maximum impact of the destruction of biomass sources is on women. Women in all rural cultures are affected, especially women from poor landless, marginal and small farming families. Seen from the point of view of these women, it can even be argued that all development is ignorant of women's needs, at best, and anti-women, at all worst, literally designed to increase their work burden.

The penetration of the cash economy is affecting the relationship between the man and women in a peculiar way and is creating a real dichotomy in their respective relationships with nature. Men have become more involved with the cash economy than women. Women continue to deal with non-monetized biomass based subsistance economy of the household. Even within the same household, we can find cases of men happy to destroy nature to earn cash even though it would create greater hardship for the women in collecting daily fuel and fodder needs.

If we take a head count at this stage, we will find that the destruction of the environment and its transformation is already affecting on an immediate and on a daily basis at least the following groups ; artisans, nomads, tribals, fisherfolk and women from almost landless, marginal and small farming households. These groups add up to no less than half to three-quarters of the country's entire rural population. And unlike the situation in the West, the question of environmental destruction is not an issue related to quality of life but it is a question of survival.

If these be the problems, then what do we do about them ? First of all, there must be a much more holistic thinking regarding the management of our land and water resources. And this will not be easy, unless a determind effort is made. For all the talk about the need for a scientific temper, it must be recognized that the current methodology of scientific analysis carries within itself an extremely unscientific practise, that of reductionism. Ecology is the first scientific discipline that has actually forced people to integrate and not reduce.

Experts sit in grand isolation. Foresters have no interest in fuelwood or in crop lands. Agricultural experts have no interest in animals or in grazing lands. Animal husbandry people never tell foresters that they must produce fodder banks.

In the life of the proverbial last man of Gandhi – or as I would prefer, the last person – all this isolated thinking brings havoc. Life for the poor become terrible. Finally, even nature turns against itself. Once denuded, the high solar energy and temperatures – the very factors that can bring high productivity and high prosperity – begin to bring high desiccation, erosion, destruction, and social and ecological poverty. FAO figures show that the effect of unchecked soil erosion on soil productivity is one of the highest in the world given the ecoclimatic conditions of South and South East Asia.

Nothing could be more important for planners and politicians today than to rebuild nature. But this can only be done if were – stablish a healthy relationship between the people and their environment. Then only a nature that is useful to the millions, not for making millions can be re-established.

If enough biomass was available, poverty, that is lack of cash, as defined by economists and by the modern civilisation, will not disappear. But definitely the rigours of poverty, the increasing susceptibility to natural emergencies like floods and droughts, will be arrested by creating more biomass.

If we were to construct a concept like Gross Nature Product, we would find that for the poor it is this indicator which is many times more important than the conventional Gross National Product. In fact, we can even say that those who do not get much from the conventional GNP – the poor – are the ones who are most critically dependent on the Gross Nature Product. The Gross National Product cannot be allowed to destroy or transform the Gross Nature Product.

(Cont. on page 31)

THE NUTRITION SYNDROME

WOMEN FOOD NEEDS:

Streelekha Batliwala presented a paper entitled 'Womenin Poverty: the energy, health and nutrition syndrome' to show that women bears additional burden of ill-health and malnutrition.

ASTRA, a cell of the Indian Institute of Science, Bangalore, published a report of their three year field study of rural energy consumption patterns. The study was conducted in rural Karnataka with a sample of six villages, comprising 560 households and a population of 3,452. The survey showed that men, women and children contribute 31,53 and 16 percent of human energy respectively to doing all the work done in the village. Most of this energy is spent not on production activities but on survival tasks like gathering firewood, fetching water, and cooking.

While women spend an average of six hours a day on survival related and agricultural tasks, men spend an average of only four hours a day on these tasks. Other domestic work like cleaning, sweeping, washing clothes and utensils, and child care, was not taken into account by the survev. These tasks are all calorie intensive and are all performed almost exclusively by women.

Streelekha goes on to give evidence for her conclusion that the calorie (energy) expenditure of woman is higher than that of men. Most of the energy expenditure of women is on daily life supporting tasks which must be performed regardless of season and which are generally not shared by men. Women have to spend much more energy because of the non availability of other energy resources. If cooking fuel and water were readily available close to the user, and the efficiency of stoves was improved, a saving of nearly 500 calories per day per women could be affected.

Even assuming for the moment that all families consume the same amount of calories, the vast majority of villagers, have worms which steal as mucn as one fourth of the total food intake and the intake level for women makes no allowance for the additional 500 or so calories needed during pregnancy and lactation, and Kamala Jayarao has shown that one third of adult Indian women are in that condition at any point in time

It is time we realized that while the care of forests is a matter of grave concern, this care cannot be at the cost of those whose livelihood depends on the forests. The women know that denundation of the forests dries up their own source of livelihood, but they pointed out that even if they use the forest discriminately, the forest contractors are sure to continue cutting it indiscriminately.

Women's involvement in social forestry appears to be a necessary condition for the success of any forest development programme. A large number of women are employed as day labour by the forest department. Yet it appears as if forest management is the sacrosanct task of men alone. At present there is no place for women in the entire forest hierarchy.

Another measure which could help is legalization of firewood collection. Women are paying bribes at present. Instead they could pay a small royalty to the government, and then collect fuelwood from specifically demarcated areas in the forest. They would then themselves protect the forest, since they would feel that it is being preserved for their use. Better transport facilities could be organised for the women to go to market. They could also be encouraged to grow quick growing fuelwood trees and fodder close to their dwelling places. This would be another facet of community forestry and would help save the rich reserve forests from denundation.

('MANUSHI') ☆ ☆

HOME CURES:

How do you relieve a toothache once you have it? In India, grandma usually resorted to clove oil, but Philippine folk medicine has other herbal ways :–

(a) Mentha cordifolia (paper mint): Boil six table spoons of fresh leaves (three tablespoons for children) in two glasses of water for 15 minutes or until one glass of the liquid is left. Cool and strain. Divide the decoction into two parts and drink one part every three hours.

(b) Psidium guajava (guava) : Chew two or three fresh leaf tops. Leave the chewed leaves on the aching tooth. Do not swallow.

(c) Allium sativum (garlic): Blanch a clove of garlic, crush and insert into the aching tooth. Remove after 15 minutes. If a burning sensation is felt, do not repeat.

(d) Ocimum sanctum (tulsi or sacred basil); Pound enough fresh leaves and extract the juice. Wet a small piece of cotton with the juice and apply it on the aching tooth. The same method can be followed with Hyptis suaveolens (Brush the chewed leaves on the aching tooth). Do not swallow. (SCIENCE TODAY Mar. 1985)

LEAF NUTRIENT — A Novel Food Source

In a world shadowed by a widespread malnutrition a cheap natural source of protein is drawing increasing research interest. Advocates of leaf nutrient concentrate claim it offers the highest yield per hectare of edible protein than any known technology and is much less expensive, in that it by-passes the expense of animal conversion. Its critics claim it lacks caloric value and essentials such as vitamin C.

The process of fractionation, or extraction of nutrients from leaves and grasses, dates back to the begining of the century. Interest in the subject peaked during world war II in Britain when a real fear of starvation created by a shopping blockage encouraged scientists to seek additional means of food self-sufficiency.

The technique, a simple pulping and pressing operation, was applied to a wide variety of green leaves, resulting in a moist green cake that could be added a la tolu (bean curd) to existing foods. In addition to providing rich sources of protein, beta-carotene, iron and calcium, leaf nutrient served a useful purpose as a ruminant feed by-product and increased the productivity of farmland

Developed at the Rothamstead Agricultural Centre, leaf nutrient was first used as a commercial animal feed, despite its original ampetus as a nutritional supplement for people. Emphasis on its value for human consumption was decreased in the wake of a 1970 UN report, which challenged the use of protein to reduce malnutrition. Research seemed to indicate that if people consumed enough calories, their protein reqirements would also be met. Concern about the so-called 'protein gap' faded, replaced by an emphasis on increasing supplies of traditional foods. Despite this change in attitude, certain scientists continued to experiment with new applications of leaf protein technology.

In the mid-1970s, a series of feeding trials were undertaken in India. The best-known project took place at Coimbatore. Chosen because of its expertise in human feeding trials the Coimbatore study focused on children between the ages of two and five. It showed that leaf extract, provided in 15 gram portions, promoted growth in children with no side effects, and supplied the needed requirements of protein. Favourably compared with dried milk, it avoided the problem of lactose intolerance and its low bulk density made it uniquely suitable for small children, who often had trouble eating enough of the bulkier grains to get the nutrients they needed in weaning situations. Foods such as plantain, cassava and sweet potato could be mixed with leaf nutrient for better results.

While no one disputes leaf nutrient's potential scientists are still divided on its application. In a recent UN report, based on the first 12 months of the 1979-1982 trials in Coimbatore, Leonard Joy argues that while leaf nutrient is rich in protein, vitamin A, calcium and iron, it is not viable for low cost diets, because it lacks high caloric value, and significant amounts of vitamins, B2 and C. He maintains that leaf nutrient is only viable where the cheapest food normally used is rich in calories, riboflavin, and vitamin C but deficient in protein, vitamin A and calcium.

Yet leaf nutrient does have some riboflavin, and its availability year round makes it cheaper than the price fluctutions on seasonal fruits and vegetables. Another study has shown that calories added to a protein-sufficient diet did not promote growth, while adding more protein did.

In addition to its obvious nutritional benefits leaf nutrient offers a way to increase the food supply, creating additional income and employment for rural communities and avoiding the impossible expense of vitamin pills or shots. Ruminants thrive on the by-products, thus creating a commercial value as animal feed.

(Cont. on page 31)

points to ponder

ALTERNATIVE FOOD POLICY

The basic thesis underlying world food-policy is that hunger is the consequence of poverty. People starve because they are poor. Make them rich, via economic development, and they will eat. This thesis is a convenient one. It interprets the problem of world hunger in a way that helps us to apply solutions that call for the maximum sale of hardware, and satisfy our short-term economic and political requirements This is consistent with modernism which sees the world as imperfect, natural man as poor, miserable and half-starved, but sees modern man with his infinite ingenuity, and his access to omnipotent science and technology, as being capable of creating a man-made paradise from which all his problems will have been eliminated–a process referred to as "development" or 'progress'. Development requires foreign exchange which non-oil producing Third World countries which, by their very nature, must necessarily lead to a reduction rather than to an increase in local food supplies. In many Third World countries, the bulk of good agricultural land is now used for growing crops for export, dramatically reducing the amount of food available to the local population. In adition, modern agriculture is extremely destructive environmentally. It involves creating vast stretches of monoculture in a landscape deprived of wood and hedgerows abandoning traditional systems of rotation and growing instead the same crops year after year, and when possible, several times a year. All this can only lead to a reduction in the soil's organic content and to its systematic dimineralisation and erosion. Development cannot provide a means of feeding the world's hungry. How can it if the expedients which alone can earn the foreign exchange required to finance it must inevitably deprive people of their forests, their land, their water and hence their food ? Development must on the contrary be regarded today as the principal agent of world hunger. The death by starvation of one thousand million people could be the ultimate tragedy of our country. What would thus seem urgently required is a totally new World Agricultural Policy, one designed to benefit the bulk of the world population, not just the politicians, the international agencies and the agrochemical industry. What should be the main feature of such a policy ?

The first is that food must no longer be grown for export. It must be eaten locally. In other words, export oriented agriculture must be systematically replaced, wherever it has been set up, by subsistence agriculture.

The second is that capital-intensive modern agriculture must be abandoned. It's destructive impact on the land is no longer tolerable – and it is of no use whatsoever to subsistence agriculturists who cannot conceivably afford it.

What do we substitute for it ? The answer can only be something approaching traditional agriculture which was developed over many centuries as the most perfect means, in specific social and environmental conditions, of feeding people, without degrading their environment.

The main problem is that the adoption of a World Food Policy designed to feed people rather than foster economic development is politically and economically unacceptable.

(From Edward Goldsmith, Editor" The Ecologist")

INDORE METHOD OF COMPOSTING

Preparation of materials

(a) Fresh green material such as weeds and vegetable trimmings. These can normally be used without pretreatment.

(b) Coarse material such as stalks of cotton, maize, millet and the pulses. These are best if broken before use. This can be done by choping with sickles or in a chaff cutter. It can also be achieved by using the materials as bedding in an animal shed or by laying them on a farm road where they will be broken up by normal farm transport. The ideal particle size for composting is below 2 inches.

Building the heaps

Materials should be stored until sufficient are available to make one or more heaps, start by laying a lattice of old branches or brushwood at the bottom. This will help with aeration and prevent water-logging of the lower layers.

The base area of the heap should be divided into six roughly equal transverse sections five of which are filled and the sixth left vacant. Each section is made up of seven layers (Fig.1) approximately 9 ins. deep, in a 9 ins layer one may have 4 inches of coarse dry wastes, 3 inches of green weeds and leaves, 2 inches of manure and a sprinkling of urine-earth-wood ash. Materials with very poor aeration qualities, such as grass clippings and sawdust, should not be placed in layers but should be premixed outside the heap with a coarse ingredient. The layering process is illustrated in (Fig. 2).

When two layers of a section have been completed, ventilation holes should be started. This is done by probing vertically through the wastes with a pole 6-8ft. long & 2inches in diameter and gradually increasing the size of the hole to approximately 4 inches by waggling the pole. The pole will remain in position and ensure that the air vent continues to the top of the completed section. The first pole should be at a distance of not more than 2 ft from the edge of the heap and the maximum distance between holes should be 4 ft. (Fig. 3).

Once the air vents have been established, the building of the section can continue as before until a height of 5 ft. has been reached. Building of the second section can then begin and so on until five sections have been completed, The sixth section is left empty, being used later when turning the heap. The heap should be lightly watered on completion and again the next morning.

Turning the heap

Within a week of completing the compost heap the centre should have warmed up to its maximum temperature. The material in the cooler region composts slowly and the weeds, seeds and diseased material may not be completely destroyed Hence it it most important to turn the heap so that the cooler top, bottom and sides are mixed back into the middle of the new heap once the central temperature has started to drop. Turning also helps the thoruogh mixing of the ingredients in the heap and enables the air water situation to be checked.

Normally the first turn is carried out ten to fourteen days after building the heap. Upto this time the only attention necessary is the occasional shaking of the poles in the air vents. Turing is done by putting the top 9 inches from section five onto the floor of section six, mixing it in the process. Water is sprayed on as necessary. The next 9 inches is then put out on top of this and watered The air vents must be re-established. When section five has been completely turned into section six, section four can be turned into section five and so on until each section has been turned, leaving section one vacant (Fig 4). The second turn is carried out after a further three week, if the heap has dried out, or the original materials are still recognisable after nine weeks, a thrid turn is warranted. The final compost product should be mature about 12 week after starting, although it may take longer in the monsoon. The mass will have cooled down and shrunk to less than half its original volume. Mature compost has a friable texture, an earthy smell and is dark brown or grey in colour.

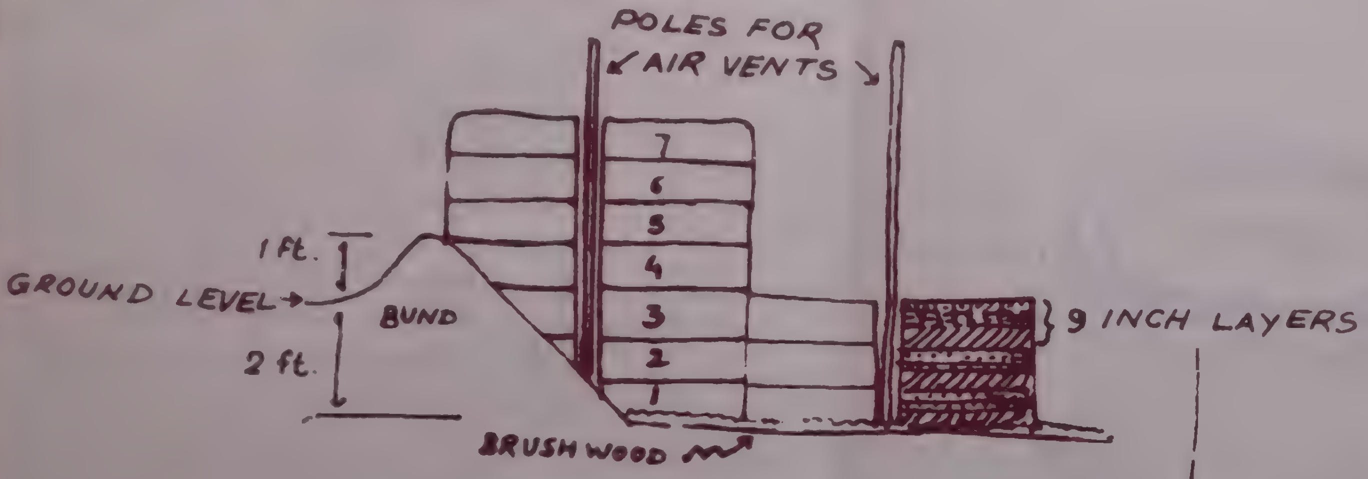
Use of compost

Compost can be used at once, should be protected from rain and sun either by the roof used during the process or covering the heap with coarse uncomposted material. It is applied to the land immediately before ploughing, and should be ploughed into a depth of not more than 4 inches, it will then be readily accessible to developing plant root systems.

(Cont. on Page 18)

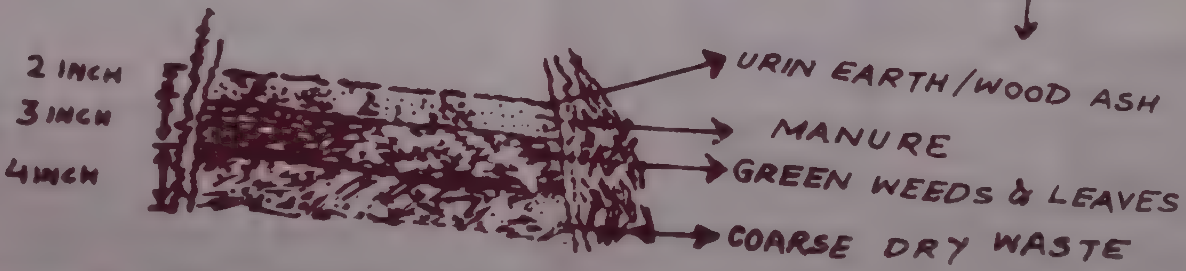
INDORE METHOD OF COMPOSTING

FINISHED SECTION OF 7 LAYERS (FIG. 1)

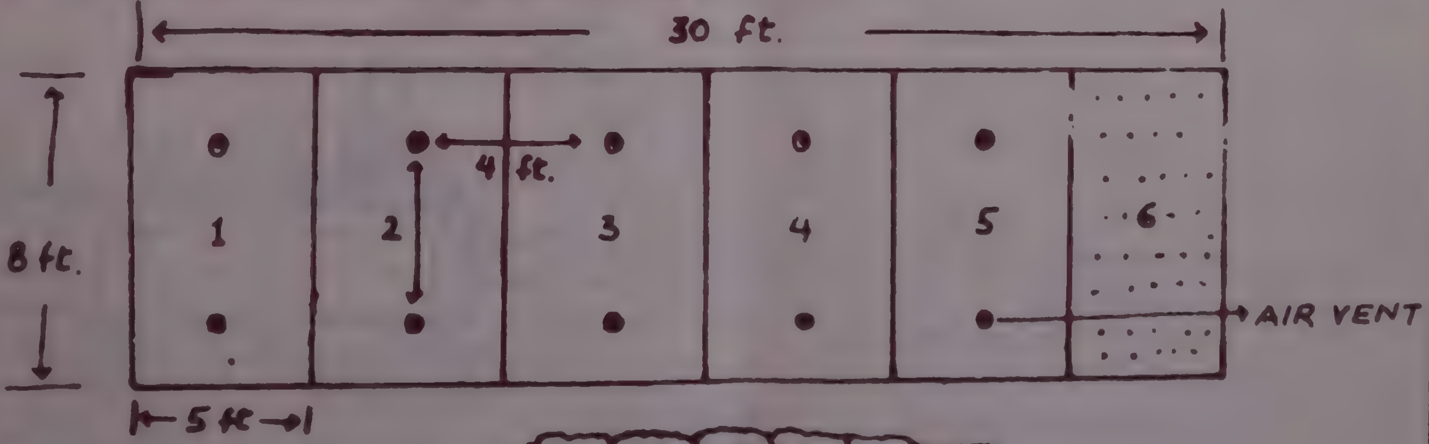

POLES FOR AIR VENTS
7
6
5
4
3
2
1
1 ft.
GROUND LEVEL
BUND
2 ft.
BRUSHWOOD
9 INCH LAYERS

COMPOST HEAP SHOWING LAYERS of INGREDIENTS (Fig. 2)

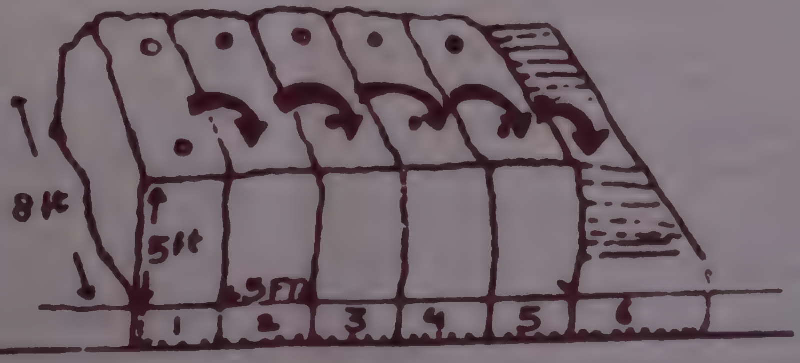
EACH 9 INCH LAYER IS COMPOSED OF


2 INCH
3 INCH
4 INCH
URIN EARTH/WOOD ASH
MANURE
GREEN WEEDS & LEAVES
COARSE DRY WASTE

PLAN VIEW SHOWING COMPLETED COMPOST HEAP (FIG. 3)

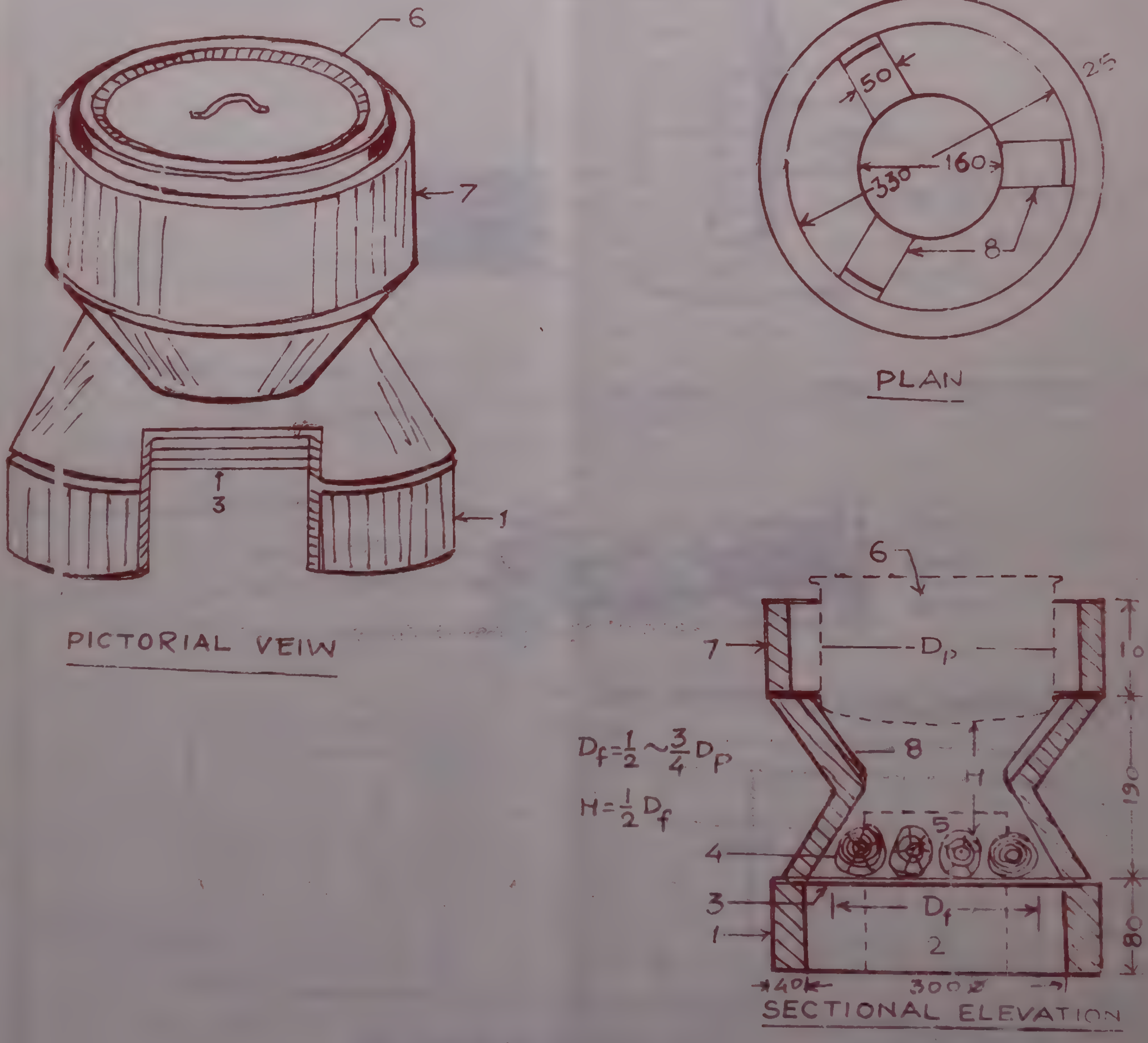

30 ft.
8 ft.
4 ft.
1
2
3
4
5
6
AIR VENT
5 ft

TURNING THE HEAP (FIG. 4)


8 ft
5 ft
5 FT
1
2
3
4
5
6

SFV, AUG.-SEPT, 1985.

DAMRU CHULHA


6
7
3
1
50
25
160
330
8
6
7
D_p
100
8
H
190
5
4
3
1
D_f
2
80
40
300

PICTORIAL VEIW

PLAN

$$D_f = \frac{1}{2} \sim \frac{3}{4} D_p$$

$$H = \frac{1}{2} D_f$$

SECTIONAL ELEVATION

Figure 1. DAMRU CHULHA

D_f - Diameter of cooking pot Df. = Diameter of fire
H - Distance between fuel top and cooking pot bottom
1 Construction for ash pit 2. - ash pit window 3 - Grate
4 fuelwood 5 - fuel charging window 6.- Cooking pot
7 - Shield for cooking pot sheet metal/clay
8 - Three equidistance ribs to support cooking pot

'Damru Chulha' an improved cookstove designed and developed at Agricultural Tools Research Centre, is a shielded light weight family size stove.

Shape of this is similar to the cooling towers of the thermal power stations where reduction in cross section area increases draft of air.

Damru Chulha

From the available data of gas cooking ranges heat output varies from roughly 1 to 3 K. W. Since the cookstoves burning the fuelwood show much lesser efficiencies than gas ranges, it is necessary to increase the output powers of cookstoves by a factor of atleast 2. Therefore a cookstove of 4 to 6 K. W. heat output should be suitable for domestic purposes.

From the combustion as well as heat transfer point of view extensive laboratory studies revealed that the fire diameter should be between 3/4 and 1/2 the pan diameter and the pan should be set at a height equal to 1/2 the fire diameter for the efficient performance (K. Krishna Prasad et al).

Inside of the Damru Chulha has a double conical shape to create better draft by venturi effect. Inside diameter of the stove at the top is 12 inches. A cooking pot of 6 to 12 inches in diameter can rest on three equidistance ribs each of half inch thickness. Gaps between the ribs form a passage for the fuel gases. Inside diameter at the bottom of the Chulha is kept more than 3/4 the maximum pan size for the reason that the effective fire diameter would be smaller as full space can not be loaded with long piece of fuelwood, in practice today. Distance 'H' will very according to the size of the pan and that of the fuelwood.

Outer shape of the Damru Chulha can be double conical with even wal thichness or a cylindrical. Material of the Chulha is clay with certain additives to avoid cracking, obtain better binding and porocity. It can be made on a potter's wheel or can be moulded by rural women who have been making and selling the traditional stoves. Sheet iron and/or wooden moulds are useful to obtain inside shape of the stove.

A grate of iron bars is provided for fuel bed. Loading the fuelwood on the grate improves combustion process. The main reason is that the air enters from under the grate and passes through the fuel bed. Such a distributed air source is likely to start combustion of volatiles before entering the combustion space. With the grate and better draft, due to the venturi effect, fuelwood combustion is greatly improved in the Damru Chulha without Chimney. Only some traces of smoke practically observed in the initial stage of the combustion.

Combustion would have been still better if the fuel opening could have been closed with a damper. Firstly it is not easy to fix a damper on a clay stove; and secondly it was felt that too many contrivances, at the first instance, have risk of rejection by the users. For the same reason a damper of the pit window is left out. Still an intelligent user can have control on the rate of heat output by placing a piece of wood or sheet metal against the ash pit window.

A shield (clay or metal ring) provided around the cooking pot reduces the heat losses from veritical sides of the cooking pot to the surrounding. These losses are considerable otherwise and are very high when wind is blowing,

The shield for the pot and the Chulha body are moulded separately. The ash pit can also be premoulded or can be shaped on the site. The Damru Chulha can be kept portable or can be mud plastered on kitchen floor. The shield should essentially be fired. The Chulha may or may not be fired.

Following simple tips shall be very useful to th cookstove users :

1. Use fuelwood of smaller size (cross section) asy 3 to 4 cms. thick and shorter in length.
2. Dryer the wood, less the smoke and more the hea output.
3. Do not charge the cookstove with a lot of fuelwood at a time. Charge it with a few pieces in the beginning. Then add the fuelwood gradually according to the rate of burning and heat outpu needed.
4. Ash pit should be separated from the fuel bed by putting the fuel on some kind of grate.
5. Keep diameter of the fire smaller than that of the cooking pot and rest the pot bottom at a distance half the diameter of fire from top of the fuel Flame should not spread more than the po bottom area.
6. To protect hot side of the cooking pot from cold wind provide some sort of shield (cylindrical o squar) to the pot. Empty kerosene tin or any othe waste tin cut into required height can serve th purpose of shielding.
7. The cookstove should be placed away from wind direction.

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P. O. Box 4, Bardoli-394691, India

Science For Villages

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Stone Block

Description : In areas where stones are abundantly available, stone masonary blocks can be manufactured and marketed. They are cheaper and stronger than bricks and can be effectively used for foundations and walls. Besides, their manufacture does not require skilled labour and is much less time-consuming than the formation of bricks.

The Stone block masonary work is cheaper than brick masonary because the size of the blocks is five times bigger than that of bricks. Unlike the brick-wall which is of 23 cm. breadth and requires one of the wall surface to be plastered to make it smooth and even, in the case of stone block the walls are of 15 cm. thickness and both walls surface are even.

Materials : The normal length, breadth and height of a stone block are 30 cm. 15 cm. and 20 cm. respectively. The blocks are cast in steel mouldes, which are rectangular boxes made from 3 mm thick M. S. Sheet, open at the top and bottom and having 2 handles of 6 mm. diameter bars welded on both sides across the width. (Fig. 10.1). For a production of 500 blocks per day, about 8 to 10 moulds are sufficient. A level surface platform is required for casting the blocks.

Construction :

Concrete : The stone masonary blocks are made of large size stone pieces bound together with lean cement concrete mix of 1 : 5 : 8 (Cement : sand : stone aggregate - 10 mm. and down). The stone pieces should occupy one third of space of the mould and should be of as large a size as can be accommodated in the mould.

Process : Arrange one or two large size stones in the mould (Fig. 10.1) care is to be taken that there is a minimum gap of 1.5 cm. between any two stone pieces and between stone and the mould to provide proper cover of the binding material all around. Fill up the gaps between the stone pieces and mould in its lower portion with cement concrete upto 3 to 4 cms. by trowelling to cover the stones, already placed (Fig. 10.2). If there is space for smaller pieces of stones, place a second layer of stones (Fig. 10.3) and fill concrete (Fig. 10.4) and compact it by a mason's trowel and also by tamping the mould by finishing the top level and smoothen.

When 6 to 8 blocks have been filled, demoulding is started first, by placing a fitting wooden plank on top and keeping it pressed by thumb while pulling the mould up in case of box type mould (Fig. 10.5) or by removing the pins and separating the sides in case of split type of mould. Demoulding should be done soon after the casting (3 to 7 minutes depending upon the weather) to avoid setting of concrete and its adhesion to the mould. These blocks weigh about 15 kg. Using the moulds with one assistant, two semi-skilled workers can make 100 blocks per day and earn Rs. 15 each.

Approximate Price Range :

Ten moulds cost about Rs. 300.

Source :

Central Building Research Institute,
Roorkee-247667 U. P.

Continued from page 12

Points to remember in composting

1. Making the compost close to animal house will minimise the transport of animal manure and will almost certainly mean easy access to water.

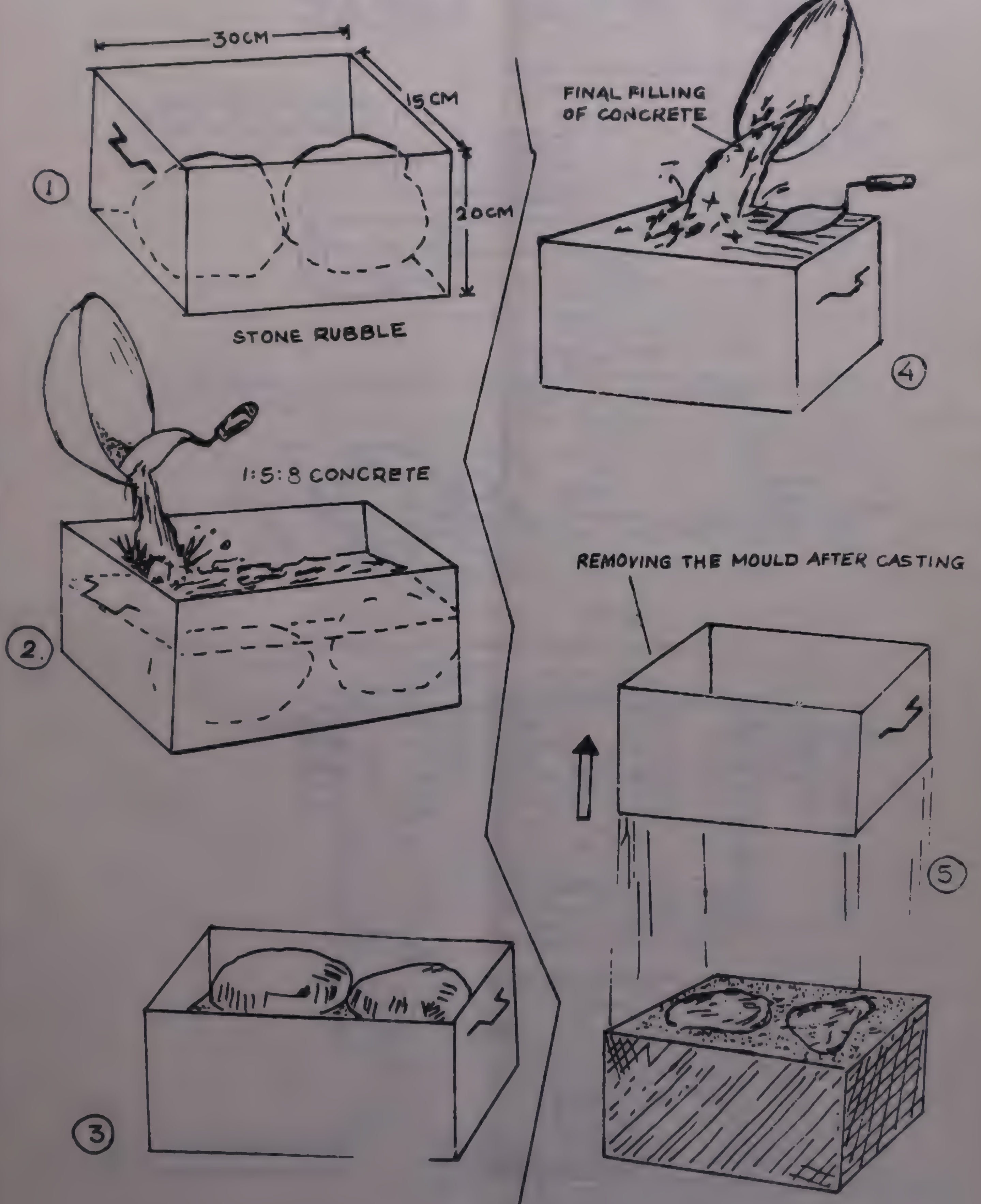
2. Compost is produced in pits during the dry part of the year and in above-ground stacks, between the pits, in the monsoon season. A heap (pit or stack) built to a height of 5 feet will produce 6-8 tons of compost per batch. It will be possible to produce 2 to 3 batches from a pit each year and normally 1 batch from a stack.

3. Construct the pit or stack at right angles to the direction of the prevailing wind. Maximum depth of a pit should not exceed 2ft and the Maximum height of a stack should not exceed 5 ft. It is far better to build up a small heap rapidly than a large one slowly. The minimum size advisable is 3 ft x 3 ft x 3ft.

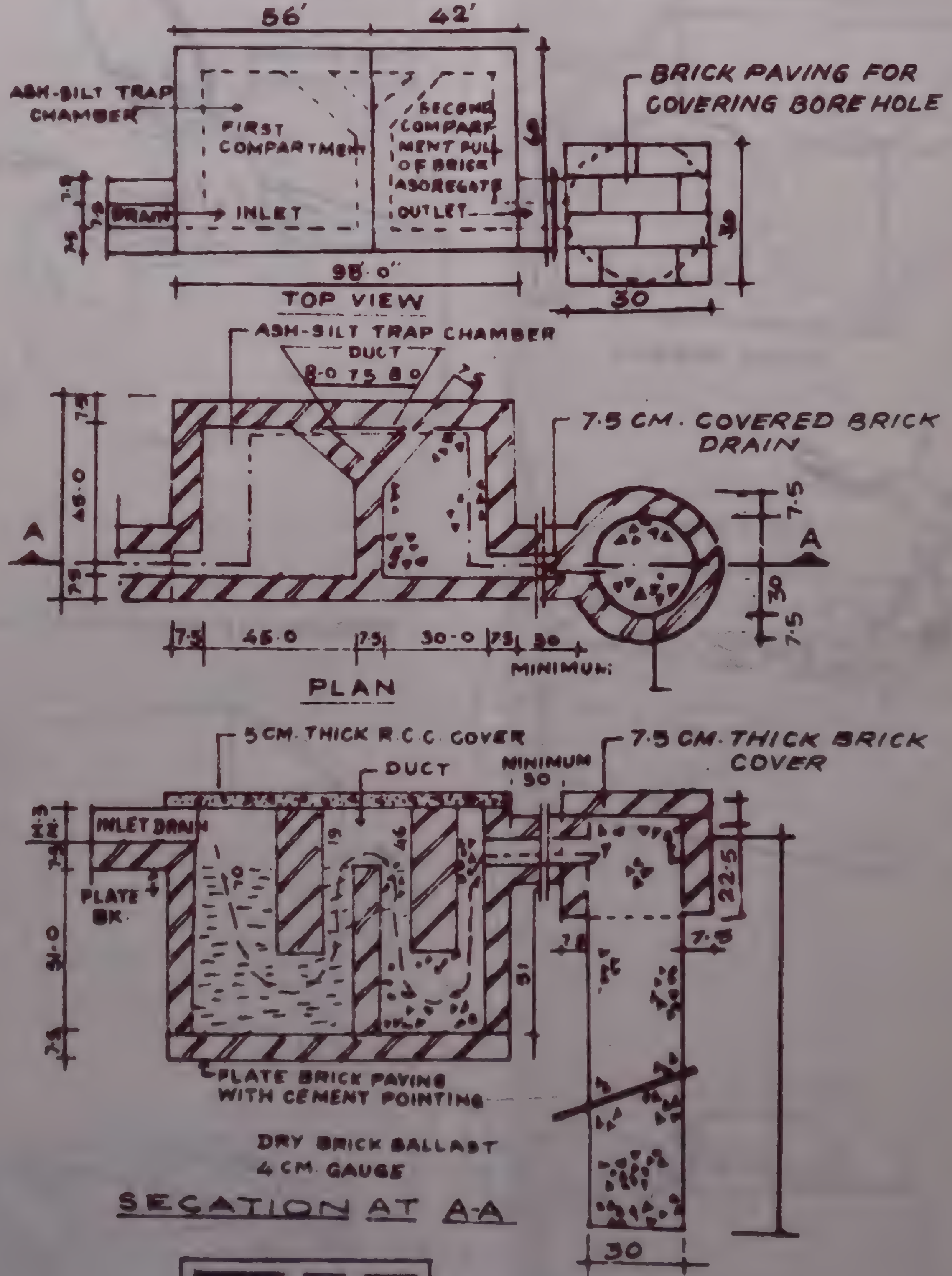
4. Roofing of heaps will improve the process by preventing moisture loss through sun and wind in the hot season and nutrient loss through leaching by rain in the monsoon. The roof should be sloped and have a minimum height above the heap of 2 inches to allow aeration. The covering can be made from local material such as coconut matting, grass matting, old fertiliser bags or plastic sheeting. If a non porous cover is used then it should be perforated with 1/2 inch diameter holes every 6 inches.

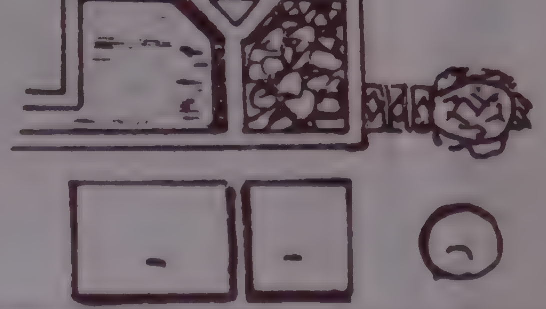
——

STONE BLOCK


30CM
15 CM
20CM
①
STONE RUBBLE
1:5:8 CONCRETE
②
③
FINAL FILLING OF CONCRETE
④
REMOVING THE MOULD AFTER CASTING
⑤

WASTE WATER DISPOSAL SYSTEM FOR RURAL AREAS.


56'
42'
ASH-SILT TRAP CHAMBER
FIRST COMPARTMENT
SECOND COMPARTMENT FULL OF BRICK AGGREGATE
DRAIN
INLET
OUTLET
BRICK PAVING FOR COVERING BORE HOLE
98·0"
30
TOP VIEW
ASH-SILT TRAP CHAMBER
DUCT
8·0 7.5 8·0
7·5 CM. COVERED BRICK DRAIN
A
A
45·0
7·5
45·0
30·0
30
MINIMUM
30
7·5
PLAN
5 CM. THICK R.C.C. COVER
DUCT
MINIMUM 30
7·5 CM. THICK BRICK COVER
INLET DRAIN
PLATE BK.
19
46
51·0
51
22·5
7·5
PLATE BRICK PAVING WITH CEMENT POINTING
DRY BRICK BALLAST 4 CM. GAUGE
SECATION AT A-A
30



NOTE:
ALL DIMENSIONS ARE IN CENTIMETERS

WASTE WATER DISPOSAL SYSTEM

The Village with drains for disposal of waste waters becasue of improper slopes, insufficient maintenance and unpredictable flow of water do not serve the required purpose. Waste waters from bathing and cooking areas of dwellings flow over the lanes and owing to the movement of carts and animals, ditches are formed. These remain full of stagnant dirty water, serving as good breeding centres for mosquitoes and flies. The Central Building Research Institute (CBRI), Roorkee, has developed a waste-water disposal system which is economic and can be maintained without outside assistance.

The system consists of an ash-silt trap chamber and a brohole. The chamber, of rectangular shape, is constructed near the waste-water outlet. It is divided into two compartments and each has a triangular duct adjacent to a corner diagonally opposite the inlet A hole is left in the partition wall 11·5cm below the top to connect the ducts. The second compartment is filled with a 4cm guage brick ballast. The two compartments are covered with an RCC or reinforced brick lid.

Construction Method

A pit equal to the outer dimensions (60cm×100cm×66cm deep) of the chamber is excavated. A layer of flat bricks in mud mortar is laid at the bottom of the pit to from a floor. The walls 7·5cm thick in burnt bricks with 1:8 cement sand mortar or 1·3 lime-surkhi mortar are built as per design (Fig, 1). This chamber, is divided into two compartments by a wall of 7·5cm thickness. The size of the first compartment is kept 45cm×45cm×70cm deep and that of the second as 30 × 45 × 70cm A triangular duct 8cm×8cm×46cm deep is made diagonally opposite the inlet of the first compartment A similar duct is made adjacent to the first duct in the second compartment.

A hole is left in the partition wall, 11·5cm below the top in the duct to provide a connection between the two ducts. All the walls of the chamber are made 11·5cm above ground level. Two precast reinforced concrate (1:2.4) covers having 5cm thickness and 56cm×60 cm and 42cm × 60cm in size respectively are made to cover the ash-slit trap chamber. The second compartment is filled with 4cm guage brick ballast.

A bore hole 30cm in diameter and at least 3 metres deep is made with the help of an auger at a munimum distance of 30 cm from the chamber. The bore hole should be made at least 6cm away from any handpump or well. A drain covered with brick is made 50cm above floor level of chamber to connect bore hole with chamber. Brickwork 7·5cm thick and 30cm deep is carried out around the circular hole to protect the top from collapse.

The bore hole is also filled with 4cm guage brick ballast. The top of the bore hole is covered by laying flat bricks plastered with 1:8 cement-sand motar or 1:4 lime surkhi mortar.

Salient Features

In the first compartment, silt, ash and heavier particles flowing with water settle down. The water with colloidal and suspended particles rises through the duct of the first compartment and flows to the second compartment. The suspended and colloidal particles get stuck to the brick ballast there and only clear water is allowed to flow into the borehole which acts as a filter to reduce the biological oxygen demand before waste-water is allowed to mix with subsoil water.

This system works satifactorily for about 4 months during which period the ash-silt deposited in the first chamber should be cleaned. This puts back the system in service. The brick aggregate in the second chamber is to be cleaned after about 8 months.

The whole system is covered and is below the ground level, and hence there is no hindrance in the movement of water nor are there any chances of mosquito breeding.

Economics

the total cost of the system is about Rs. 200.

For further details contact

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FUEL COLLECTION IN WARDHA

–Sadhna Deshmukh, CSV, Wardha

The villagers in wardha block use, along with firewood, agricultural wastes like cotton, tur (Arhar) stalk and cowdung cake. 30% of the population which. is poormost does not use firewood at all. Seventy percent of the population uses firewood along with agriculture waste material. Farm owners fulfil their needs by cutting trees from their own farms but agricultural labourers do not possess land so they face much difficulty in collection of fuel.

Women are usually burdened with the work of collection of fuel and for this she travels one to four kilometres of distance and brings the firewood on her head The kind of fuel she collects are twigs and branches and usually she does not destroy the trees, whereas the men use bullock carts to bring firewood by cutting mature trees.

Women also collect fuel from farms by removing the agriculture residues and seasonal thorny fences. Sometimes they have to give one half or one third portion of the fuel thus collected to the land owner. This in the case of cotton stalk and tuar stalk and such other fuel material from their field.

Women spend two and half hours on an average every day or 17.5 hours per week for collection of fallen twigs, wood chopping from forest, dried cowdung along with other agricultural waste for cooking fuel.

Every day the distance to be covered for collection of firewood increases as the tree cover of the area gets thinner and thinner.

The yearly need of firewood per family is calculated at 250 kg. of wood and two bullock carts of 'tur' or catton stalks. A day's requirement of firewood is Tur / cotton stalk–4 3 kg. and 2.4 kg. firewood. Families using only agricultural waste require 7 kg. cotton stalk per day for a family of five members.

Women labourers collect firewood on their way back home spending one to two hours daily.

In case of artisan women, they spend the whole of Sunday from 6 a. m. to 6 p. m. in collection (picking, chopping tying bundles, carrying the headload and walking on foot).

Cowdung is available in winter and summer in the forest. One day's collection is one to two baskets. The families with cattle make dung-cakes in summer and store them in Dholas (drums made of tur stalk) two to three Dholas with 200 dung cakes in each Dhola.

Problems:-

- –Carrying heavyload on head for long distances.
- –Fear of authority i.e. landlord, forest officer, cattle owners and other wood pickers.
- –Agricultural waste is no more given freely to the labourers.
- –Tools used are mere sickle and that too is inefficient.
- –In rural areas money is not spent on fuel thus women's egnery and time spent on collection of firewood is not equated with monetary gain or saving.
- –Ninety-five percent families use traditional chulhas requiring more firewood. Apart from it there are other problems attached with it, like more time spent (2 to 4 hours) in cooking, where socio-economic status is high and the number of family members are more, it tacks comparatively more time for cooking than in poor families. Soot gets collected on utensils, walls and roof, therefore extra waters is needed for cleanig utensils. Because of smoke the kitchen becomes so dingy that a 'Dibri' (small kerosin lamp) has to be kept lighted the whole day. Smoke from smokey chulhas has quite an ill effect on the women's health. ●

TAKING TECHNOLOGY TO VILLAGES

(A Report of National Research Development Corporation)

Shri Shivraj V. Patil, Union Minister of state for science & Technology says : "Much useful work is being done in our Research and Development Institutions. Some of this has resulted in Appropriate Technology being developed for the farm and the field. However, it is a matter of concern for us that the technologies are not effectively reaching the end-users in the villages. We are committed to a programme of satisfying the minimum needs of the people especially in the Backward & Remote Areas, and in this context Technologies for the People need to be looked at closely."

Apparently the weak links in our programmes are not so much the technology generation, but more so their transfer, acceptance and diffusion. Seized of this problem, the National Research Development Corporation (NRDC) has been attempting to evolve models and structures for bringing about effective transfer of technologies from the Lab. to the Land. Here are few of the examples of NRDC activities in the field of rural and appropriate technology which should have the following criteria :-

> Be capable of generating employment, utilising local resources (human and material).
>
> Need low capital investment and result in low cost production of products marketable close to the place of manufacture, besides having as short a gestation period as possible

The NRDC has so far set up fourteen demonstration-cum-training centres in different parts of the country.

Imphal Centre

125 persons have been trained in technologies like cattle lick making, agrowaste compaction, leaf cup making and water filter candles.

Kerala Centre

MitraNiketan is now planning to set up a demonstration unit for the manufacture of water filter candles and have also approached the Corporation to install one mini milk chilling unit operated on biogas for testing and trials in their premises. Increasing interest of the local people is directed to some of the following items :–

Coconut leaves as thatching material with extended life, cattle lick, safe drinking water, solar cookers, driers, improved wood burning stoves, paper slates, ferrocement bins, balwan bullock cart of improved design, paddy planters, mini rice mills etc.

West Bengal Centre :

This centre at Narendrapur in 24 Paraganas has been set up in collaboration with Ramakrishna Ashram. Below pump for pumping water from shallow ponds, leaf cup making machine and the solar grain drier.

5. **Nagaland Centre** at Chuchuyimlang under Gandhi Ashram has informed that the people have evinced particular interest in the community water purification system and improved wood burning stove.

6. Maharashtra Centre :

Kuvelanja, dt. Ratnagiri in association with Gokul Prakalp Pratishthan Ashram, includes community and domestic water purification units, leaf cup making machine, rope making machine, cattle lick salt, solar cooker, improved wood burning stove, balwan bullock cart, ferrocement bin, rice transplanter, improved sickle and smokeless chulha. Four low-cost rural latrines and two bathrooms have also been constructed at the centre.

7. Haryana Centre ;

At Fatehabad in Haryana, in association with the district industries centre of the Directorate of Industries, has taken up for demonstration technologies such as paper slate, cattle lick, ferrocement bin, agricultura implements, water filter candles, efficient wood burning stove, low cost latrine and rural water disposal system.

8. Jammu Centre :

At Udhampur, has arranged for demonstration of paper slate, cattle lick, water purification system and efficient wood burning stove.

9. Attara (U. P) Centre :

Rice husk ash which is available in huge quantities in rice growing areas, poses a problem of disposal Taking advantage of the high silica content in ash, a cement like product can be produced by grinding it with limestone under controlled conditions. The product which resembles pozzolana cement can be used in a variety of construction purposes.

A 3 tonne per day batch plant fully funded by the NRDC has been set up at Attara in U. P. in association with M/s. Vigyan Shiksha Kendra. Free training is available at the centre for those who are interested.

Simultaneous with opening demonstration-cum-training centres the following projects are under development :–

1. Mini Milk Chilling Unit :-

NRDC in collaboration with school of Applied Research, Sangli, Maharashtra, has developed four designs of mini milk chilling units of capacity 500 Ltrs and 1, 500 Ltrs. The four proto-types are now under test. A few of these prototypes after testing will be sent to some of the RTDT centres, already opened not only to create an awareness about this development to the farmers, but also to get a feedback from the actual users.

2. Blue Green Algae (BGA Seed Production) :

For a developing country like India, one of the limiting factors in crop production is the paucity of chemical fertiliser and their prohibitive cost. The rice crop covering over 38 million hectares of land in India, accounts for the largest share of chemical fertilisers used in the country.

Rice being the most staple food, occupies nearly 37% of total crop area, with an average yield of 1.7 tonnes of paddy per hectare. In view of the fact that there is considerable potential for improving the yields by supplementing the nitrogen requirement in the rice fields by BGA, a great deal of interest has been generated in the biological nitrogen fixation system as an alternative to the use of chemical fertilisers. BGA is ubiquitous in its distribution ranging from snow to hot springs. Rice fields provide ideal conditions for their growth and proliferation. It adds about 25 to 30 kg. of atmospheric nitrogen per hectare per cropping season. While in the fields, BGA obtains its energy for nitrogen fixation in the soil directly through photosynthesis. Besides, algae provide the crop plant with other useful organic substances like growth factors, vitamins etc. Thus BGA is a natural substitute for chemical nitrogenous fertilizers and can ultimately relieve the pressure on the fertiliser industry to a considerable extent.

Based on the natural ecology of the algae, a simple rural oriented open air method for their production in bulk has been developed at IARI, New Delhi. The basic principle is to grow them in natural sunlight under simulated condition existing in the rice fields. The starter culture - a soil based mixture of Aulosira, Tolypothrix, Nostoc, Anabacna and Plectonema - is supplied by IARI.

For production of BGA, shallow pits / trays 160 x 90 x 270 cm lined with Polythene sheets are made and filled with 10 kg. soil mixed with 200 g. super phosphate. The pits are then filled with clean water upto a depth of 6%. After the soil settles down, saw dust and starter culture of BGA is sprinkled on the water surface in the pit which is open and exposed to sun. The growth is rapid and in about a weak a thick algae mat is formed on the surface of the soil. Water is added interminaltly to compensate for loss due to evaporation. When the algae growth is sufficiently thick, addition of water is discontinued. The dried algae flakes from the surface of the soil are collected and bagged for use in the fields. The pits are again filled with water for a second crop of algae. The soil in the pit is renewed after every 3 to 4 harvests of BGA.

BGA is a natural nitrogen fixing agent and can replace about 3J% of the chemical fertilisers such as urea.

3. Heavy Clay products from non-Conventional Clays :

In order to use local raw materials and skills and provide employment potential to the village youth, it would be desirable to set up a small scale clay products unit in a rural area to produce building materials like bricks, roofing tiles, flooring tiles, tiles for canal lining etc.

Centre for Application of science and Technology for Rural Development (CASTFORD), Pune, a wing of Indian Institute of Education, Pune, has identified the need for putting up a demonstration-cum-training-cum-replication (DTR) unit for production of building materials from clays in rural areas and suggested M/s. Technocrats India (T. I.), Panvel. A group of engineering graduates from Indian Institute of Technology, Bombay, in the discipline of Mechanical and Civil Engineering are engaged in manufacturing of building bricks for the last four years at Village Kamothe near Panvel.

It is proposed to set up a Demonstration-cum-Training cum-Replication Unit for making clay products.

In its endeavour to popularise rural technology, the National Research Development Corporation of India has extended its field of activity to other developing countries. It is likely to set up rural technology demonstration centre in some African countries like Kenya, Senegal and Morocco.

Even though the RTDT Centres would help in the propogation and dissemination of the technologies relevant to the rural areas, it may be necessary to open exclusive centres to demonstrate technologies relevant to the needs of the Adivasis, women, tribals and other weaker sections of the society. These centres will be so designed that the technologies demonstrated and training given contribute in enhancing the employment opportunities of the weaker sections and thus improve their standard and quality of life.

DEMONSTRATION-CUM-TRAINING CENTRE FOR SPECIFIC TECHNOLOGIES:

There are a number of technologies relevant to the rural needs but due to high capital investment, it is not possible for the rural people to take advantage of such development. Therefore, in order to serve the weaker section of the society on a community base, it is envisaged to establish demonstration centres for specific technologies where the economically weaker sections can come and have training. So far, NRDC has set up two centres for the production of cementious material from rice husk. The idea is that after training, a group of people can join together and set up such units in their areas. some of the proposed projects on the anvil are : solar timber seasoning plant, a solar drier for drying tobacco, tea, etc.

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ABOUT US –

Technology : A Tool For Change

A Rural Technology Seminar entitled : "Science & Technology for Rural Development", was convened at CSV Campus at Dattapur (Wardha) under the aegis of Centre of Science for Villages, Wardha and was sponsored by Department of Science & Technology, Government of India. one of the major objectives of the seminar was to coordinate the activities of the technology generating and technology transferring agencies in Maharashtra which are directly involved in the rural development work. About 92 such institutions/individuals had been contacted of which 42 of them participated in the seminar. This is a part of its report. :–

A. Biogas Technology :

Although Biogas technology is most appropriate to the rural situation, it is at present reaching only the rich farmers and middle peasants and is out of the reach of rural poor due to its exhorbitant initial cost and requirement for larger number of cattle for cowdung required to feed it. The technology therefore needs to be improved on the following lines :–

(1) lowering the cost of construction of the gas plant by using local, cheaper and still more manageable raw materials.

(2) increasing the efficiency of the digester which would thus result in reduction of its size and ultimately the cost.

(3) since most of the rural poor do not own enough cattle to provide cowdung for the biogas digester, more stress be given on other supplementary biogas materials for feedstock like agro-wastes ect.

(4) As the technology is imbed with a wide potential for employment generation, a special stress be given on training the rural youth as 'Rural Biogas Technicians' to ensure local agencies for looking after the repair and maintenance of the biogas plants. This should become an important facet of the National Biogas Programme.

B– Smokeless Chulha :

Collection of fuel and cooking with traditional chulha (cook stove) consumes lot of time in the life of the rural women leading to her drudgery. Although many designs of smokeless chulha have been tried for replacing the traditional ones, they are still attributed with many problems which need due attention. Hence, there is a wide scope for improving the smokeless chulha and attempts should be made to concentrate on the points mentioned below :

(i) The design should be suitable to local needs e. g. (a) the use of the available agro-waste used as fuel, (b) proper baking of sorghum breads (Bhakar) (c) using local materials like rice-husk, saw dust, cowdung or horse dung to be mixed with clay in proper proportion to stabilize the soil used for construction of the chulha.

(ii) The chimney may not always be necessarily taken out through the roof since sometimes the smoke helps eradicate insects, mosquitos, turmites in the house etc. It should, however, always be above the head level. Clay pipes made by local potters could be used to make the chimney.

(iii) Chulha should be portable so that it could be sold at rural weekly markets and taken from there to village houses

(iv) For better heat transfer, the utensils should lodge partially inside the chulha.

(v) Since the damper and the grate make the handling complex and many a times their mishandling increases the consumption of fuel as against the expected decrease, the new chulha may, therefore, be designed without damper and grate even at the cost of slightly low efficiency compared to the ones attributed by their use.

(vi) The design should be simple and easily acceptable to the villagers.

(vii) Since the men would be paying for the chulha and as they are not aware of the level of the drudgery their counterparts are put to, the capital cost of the chulha be kept as low as possible.

b) Use of Compost :

Realising the ill effects of continuous application of chemical fertilizers to the soil and more and more use of compost in order to replace or at least supplement the chemical fertilizers has become necessary. For this, though large amount of agro-waste is available most of it is now being used as fodder and in construction of houses, cattle-shed, fencing, etc. However, more economic use of available agro-waste can be made for composting. Besides, large amount of seasonal weeds especially those growing during monsoon can be used as raw materials for composting. It was also felt that traditional methods of composting attributed by large scale use of cowdung, takes long duration for maturation and loss of nitrogen in the form of Ammonia and Nitrates in the air and soil respectively, needs to be improved with proper scientific inputs. For example, Semi-mechanical methods for town-garbage utilization in making compost can be undertaken. The garbage is collected in a tank above ground provided by wind rows. The garbage is sprinkled with water to make it 40-50 % moist. After 7 days the garbage is subjected to turnings and twisting and left over for another 21 days for maturation during which the temperature rises to about 700C under aerobic conditions. After one month the compost is ready for use. Similarly in NADEP method of composting, agro-waste, cowdung and soil are used in proportion of 100 : 4: 60 by weight and composting is brought about in over ground tanks under semi-aerobic situation during 3 to 4 months. Very important highlight of this method is the requirement of cowdung in very low quantity against the large amount of agro-waste being composted.

It is necessary to gather more information on leguminoses which could be tried as inter crops with the cereals and others which could be used as green manures. Out of the total Nitrogen fixed by leguminoses about 50% is used for their own consumption and rest is available for other crops growing in vicinity.

Pest control :

In order to bring about reduction in the use of insecticides for getting rid of their hazardous effects, alternatives should be found for pest control e. g. removal of caterpillars from piegeon pea crop by mere shaking of the plants, collection of caterpillars in a basket and their destruction at far off places, spraying of extracts of neam leeves or neem seed powder mixed with water as an insecticide. Shri Ashok Bang stressed that for switching over from insecticides and pesticides to the methods of biological control requires a big social change in our attitude.

Kitchen Gardening :

The concept of kitchen gardening was acceptable to all as it ensures much required nutritional food and as it also takes care of sullage water.

Dr. Tilak enumerated the experience of CASTFORD in popularizing winged beans in tribal villages in Thane district as it is becoming widely popular as it meets with their emergency needs in September when no food is available with them. They prepare vegetables with its leaves, flowers and young legumes and also make preparation with the seeds. The tubers coppice every year.

It was suggested that some water loving plants like aloe, citronella etc. can be tried to solve the problem of sullage of water. The latter is also a good mosquito repellant. Local fruit trees like Ber, Guava, Mango, Custard apple, Karvand, Awala, Papai can be grown on sullage water. They can even stand well the moisture stress conditions. Major problem felt is the availability of reliable stress resistant and grafted varieties of fruit trees. It is also necessary to take measures to multiply and grow mother plant materials which accept the graft.

The real challenge of kitchen garden lies with the most economic use of water, use of very limited space and use of cheap but reliable fencing. The need for experimentation in the area of fencing was stressed.

Some plants like Mehndi, Vilayati Chinch, Sisal, Beshram, Agave, Sitaphal, Karvand were suggested as live fencing to the kitchen garden.

In response to the problem of monkey menace, Mr. Bapat reported a case of monkey trapper, Abdul Kadar, Monkey Contractor at Pandhurna, Dist. Chandwara, M. P. who could on invitation successfully trap the monkeys and let the village free of them in the years to follow.

The new afforestation programmes of the Government (and voluntary groups) should include implantation of more and more of local fruit trees to contain the monkeys their natural habit, thus curbing the monkey menace in villages or small farm.

HEALTH & SANITATION : Potable water : The problems of potable water in villages are :

(1) Unassured supply of drinking water throughout the year and the non-availability especially during summer.

(2) Extraction of water is difficult due to fetching it from very deep wells and its carriage to long distances.

(3) Water is not hygenically safe for drinking at the source.

(4) Storage and handling of potable water at home

The following suggestions were made :

(i) Percolation tanks are found to help in raising water levels in near by wells, their large scale construction be demanded for.

(ii) Bore wells are found to be safe for drinking water ; while samples collected from open wells are noted to be contaminated. Hence, government can be pressed to install more and more bore wells in villages mainly to supply drinking water.

(iii) Hand pumps installed in villages for drinking water are most of the time out of order as there is no agency to look after them. It was felt that local personnel be trained and some voluntary agency arrange such training courses for village youth in repairing of pumps. As the responsibility for maintenance is owned by Gram Panchayat it should also arrange to pay the repairy charges to the trained youth as and when required.

(iv) Open dug wells constructed using concrete concentric rings. covered at the top and installed with hand or power pumps make the water safer for drinking

(v) NEERI has also developed a simple

BOOK WATCHING

Some useful Directories :

Rural Development & Appropriate Technology (National)

1. Directory of resource institutions engaged in rural development : Published by National Research Development Corporation of India, 20-22 Zamroodpur Community Centre, Kailash Colony Extension, New Delhi, P. 323. It contains information on 170 organisations engaged in the task of rural development and to know who is doing what in the fiild of rural development.

(Cont. on page 32)

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technique of pot chlorination in well, using sand and bleaching powder. This would ensure safe potable water after treatment of surface water. It is, therefore necessary to press the government to make use of the technique on large scale.

(vi) Even when the water is safe at the source of collection, it is contaminated at home due to mishandling, use of candle filters can be considered. If Contaminated it can become free of bacteria, if stored in copper vessel or even if it remains in contact with copper plate. Copper being bacterio-static element, checks the bacterial growth. This technique be tried at experimental level in some villages. Some simple filters using alum and charcoal may also be tried.

Disposal of Sullage Water :

In the absence of any reliable drainage system, treatment of sullage water becomes a problem in villages when it spreads all over the narrow muddy roads and becomes sites of attraction for mosquitoes and microbes. Use of soak pits very well answers for waste water disposal. There is a need to develop soak pit designs suitable to varied conditions of soil, amount of water spillage etc.

Disposal of night soil :

Construction and use of latrines is not a felt need of the people in the villages even though it is most essential for rural health. To begin with latrines put up in the villages to facilitate the aged citizens, patients and ladies especially during nights. Safe disposal of night soil is more a social problem than that of science and technology. The concept can also be made acceptable if joined with productivity by making them understand that it fetches money through sale of valuable compost.

Latrines should not be constructed free of cost by government and beneficiaries be helped only by offering a latrine seat and one bag of cement ; otherwise very importance of the concept is lost.

A growing tendency amongst the beneficiaries of biogas plants is to construct attached latrines to new biogas installations. At least 25 to 30% of the gas plants put up in Wardha district in the last two years are attached with latrines. A drive, should be made to attach latrines to the digester as part of a condition to release the subsidy for biogas constructuction.

TRANSFER OF TECHNOLOGIES :

The suggestions included :

(i) Although the application of technique into villages evolved in big laboratories is tried, we do not even bother to take the technique from one village where it is practised for many years into another village nearby.

(ii) Voluntary agencies should help in solving the local problems with S & T inputs at micro-level and once it is proved successfully, government should arrange for its application at macro level ; policy-makers should help in this process.

(iii) propagation potential of any technique Should be well thought of at the stage of its generation only.

(iv) Voluntary agencies working in villages - can play an important role in - a) Needs identification, b) undertaking feasibility tests / demonstration project, c) technology transfer, d) creating awareness, e) special experimentation, f) feedback to R & D agencies

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WINDOW TO THE WORLD

Science for Villages is not an isolated effort. It is a part of a world-wide movement of A. T. Here is an account of the ideas and activities of the birds of the same feathers from overseas.

1. Acupuncture cure for habitual smokers : A soviet doctor from the crimean city of Yalta claims that he can cure smoking addicts within thirty minutes. Dr. Igor vasili Braiko an Uro-pathologist has adopted a method by which some vital points in the ear are acupunctured by needles as a rusult of which the addict develops an instant distaste for smoking. Nearly 40 per cent of his patients gave up smoking totally, the other 60 per cent, he says, are not willing patients. A desire to give up smoking is a must in this treatment. Dr. Igor Braiko said of the over 1,500 voluntary patients he has treated, 94 per cent had given up smoking. The treatment is over when the burning sensation is replaced with a sensation of the treatmenet. (Hitavad, 8th sept. 85.)

2. Garlic - from legend to Medicine : Ancient Egyptian pharaohs knew and appreciated garlic and the onion, which scientists call Allium Sativum and Alloium Oepa, respectively. An ancient Egyptian medical text from about 1550. B. C. lists 800 prescriptions, against heart complaints, insect bites, worms and boils.

professor Ewald Sprecher of the Hamburg Institute for Pharmaceutical Biology says garlic juice, even if diluted to one part per thousand, kills bacteria and other micro-organisms, among them are the causative agents for cholera, typhus, dysentery and enteritis.

Other experiments indicate both plants are anti-coagulants, according to a recent science magazine. Research into identifying and isolating the curative ingredient show the extracts work to prevent blood platelets from joining to form clots

Isolated a chemically unstable, colourless compound which he called Allicin and which he found to be anti-bacterial and a fungicide.

3. Anti Asbestos Plan : Sweden is to embark on what is probably the most comprehensive programme undertaken so far by any industrialised nation to eliminate the use of asbestos.

Under a 28-point programme recommended by a commission headed by the labour minister a country-wide inspection of all buildings with machanical ventilation systems is to be completed by December 1986, to check if asbestos has been used in the buildings.

Neglecting to have the work carried out will be liable to punishment. sale of passenger cars and motor cycles having asbestos brake linings will be prohibited with effect from January 1, 1987, by a decision taken by the government some time back. A similar ban will come into force in regard to trucks having asbestos brake linings and the use of asbestos in clutches in all types of Vehicles from July 1, 1987. (Times of India, 12th Sept, 1985.)

4. Decontaminating the drinking water : Drs. K. Ahmad and K. Jahan of Dacca University, and Dr. I. Hug of the International Centre for Diarrhoeal Disease Research in Dacca, have come up with a way to purify drinking water by adding Potash Alum. According to their report in the June 1984 issue of the Food and Nutrition bulletin, a amount of potash alum (500 micrograms) added to a liter of pond water can kill the becteria, that cause cholera and diarrhoea, in one to two hours. (Life, vol. 18, No. 3.)

Israeli Mosquito-Killing Bacteria

Dr. Jeel margalit, a biologist at the Ben-Gurion University of the Negev, recently stumbled upon a swarm of deceased mosquito larvad in a pestilent ditch 40 kilometres west of Beersheba. On inspection, he discovered that the insects had died of natural causes. His finding is raising eyebrows-and mosquito-netting-around the world, for he has apparently identified a type of infectious bacteria, found nowhere else in the world, which kills mosquito and blackfly larvae by paralysing their digestive tracts. Sprinkle a bit of the bacteria in a mosqito larvae-infested puddle and the larvae are dead within 30 minutes

The World Health Organisation, which endorses and helps fund Margalit's research considers the technique "remarkably safe". Tests indicate that these rare bacteria attack mosquito and blackfly larvae - and nothing else. (Source : News From Israel)

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(contd. from page 8)

In other words, it is not enough to preserve biological diversity in just those areas of our country where the flora and fauna are genetically rich and diverse by setting up biosphere reserves and national parks, but that biological diversity must be preserved and /or recreated in every village ecosystem.

If we fail to recreate nature on a massive scale in a manner that generates employment and equity, not only our villages but also our cities will become unlivable. We are today the world's fourth largest urban population. Before the end of the century we will be the largest. Managing this huge urban population will call for extraordinary political and managerial sagacity, something we cannot learn from the the rest of the world. But one thing is definite, if the process of urbanization continues to create the same demands on our rural environment, it will only accelerate the destruction of the rural environment and in turn make the urban environment impossilble to manage. India cannot survive without a low-energy, low resource input urbanization. In its absence, no law or laws which try to turn the incoming ecological and economic refugees into our cities into criminals will work.

(ANIL AGARWAL IS THE RESEARCH DIRECTOR AT THE CENTER FOR SCIENCE & ENVIRONMENT DELHI AND A KEEN DEVELOPMENT JOURNALIST.)

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(Contd. from page 10)

Fractionation is also suitable for small-scale production providing low capital costs. Traditional food grinders and small presses can be used at the household level while fractionation for animal fodder has proven practical in India using local equipment and labour.

The nutrient production of leafy crops is higher per unit area than is grain, making it economically advantageous to farmers Certain crops could be grown for their energy value, others for protein, vitamins, and minerals. On a larger scale, farming could also produce green leaf for sale to fractionation plants, thus creating an additional source of income. Leaf nutrient has the added advantage of simplicity. It is a true convenience food. Easier to prepare than flour or grain products, it is no less acceptable in its natural state, indeed, in countries like Sri Lanka and Nigeria, green juice extracted from leaves has been eaten for years.

In a world where protein is desperately needed, it is simply another under exploited resource ; one that is economical, feasible and safe. Despite his own reservations, Leonard Joy's report reaches the conclusion that further feeding trials are unnecessary and instead recommends that the international community work to identify situations in which leaf nutrient could be put to best use.

Science For Villages

Yearly Subscription Rates

Individual India Rs. 15–00 Foreign 10–00 Dollars
Institutions India Rs. 25–00 Foreign 15–00 Dollars
Address : Editor, Science for Villages, Magan Sangrahalaya, Wardha– 442001 (M. S.)

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and more remunerative occupations a mechanism to help in their entreprenurial activity requires that they are not burdened with (a) supply of raw materials and (b) sale of finished goods. A group of villages (including big, medium and small) have a net work of depots where the artisans can purchase their raw materials and sell their finished goods. These depots should act also as quality control centres as well as technology transfer and servicing centres.

- ☆ Unless large production of consumer goods is done in the villages through the BPL and money flows from the city to the villages, the condition of the villages and the BPL will continue to remain miserable. This may require reservation of certain areas of production only from the villages.
- ☆ The Employment Guarantee Scheme (EGS) as practised today has its limitations since civil work which usually gives such employment is not possible to be regularly generated in the village where the BPL lives. They have to trudge long distances to seek work and when the distance is such that thev cannot manage from their homes they have to become nomadic which none like. Moreover the EGS does not create permanent work for them nor improve their status.

EGS therefore shall give such work to the poor which create potentiality of greater and better employment for them in the future. Ultimately we should see that the wage earners become self-employed.

Devendra Kumar

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2. Directory of Organisations involved in Rural Development and Appropriate Technology : Compiled by Dr. Padma Vasudevan, Centre for Rural Development and Appropriate Technology, Indian Institute of Technology, Hauz Khas, NewDelhi–110016 pp.92, 1980.

The Directory lists organizations which are involved especially in education, health, agriculture and appropriate technology at rural level. It contains names & address along with the activities undertaken, as well as persons to be contacted. It includes statewise list of 509 voluntary organisations from 24 states and a brief about Central / state ministries involved in rural development, Foreign organisations engaged in rural development and Industries involved in rural development.

3. Directory of Voluntary Action : Compiled by : Association of voluntary agencies for Rural Development, o.pp. G.P.F, Deen Dayal Upadhyay Marg, New Delhi -- 110002, 1979, pp. 113 Statewise information of voluntary organizations India, including the union territory, working in Social Work, Rural Development, Agri-works, Environment, Inter-activities and their publications. The list of open bodies and foreign funding agencies is also listed.

4. Constructive Institutions of India :

Compiled by : Gandhi Smarak Nidhi,

Rajghat Colony, New Delhi- 110002, pp 526 1977 the utility of this directory gives statewise detailed information about institutions and workers engaged in activities inspired by Gandhiji and Vinobaji in India, for the purpose of contact and coordination. A detailed profile of 1,845 institution from 22 states with contact addresses.

23. EDITOR
CFTRI NEWS LETTER
CENTRAL FOOD TECHNOLOGICAL
RESEARCH INSTITUTE
MYSORE - 570013
KARNATAKA

Published by : Devendra Kumar on behalf of Science for Villages, Wardha, : Devendra Kumar,
Managing Editor : Rajiv Gupta
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya Wardha 442001, Maharashtra.

SCIENCE FOR VILLAGES

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84-85 Oct.-Nov. 85 Monthly Annual Subscription : Rs. 15/- (10 dollars) Iudividuals and Rs. 25/- (15 dollars) Institut

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C. F. T. R. I., MYSORE

Remembering Gandhi

This is the October-November Issue- the time which in India brings the memories of Mahatma Gandhi. Gandhi mobilised the vanquished and exploited people of this land through a non-violent truthful approach and made peopla from all vellages and cities of India io participate in the freedom struggle in such large numbers that there is no parallel in world history of universal participation in sacrifices of such a nature. He thus purified the politics of power to a politics of principles. This moral force did not only help the British to get out of an unjust situation but also made the common people of India to realize that each one of them had in bringing about this change. This latter is the principal reason why despite the heaviest odds: democracy is persisting to express itself in this country - as is not discernable in any other Third World country. This state could be traced to the Gandhi phenomenon as his non-violent 'Satyagraha' was a participatory process which together involved the small and the big of the land and gave the people reliance in their democratic strength.

Apart from the political influence of Gandhi, more important aspect of his coutribution was his endeavour to create a classless and castless non-exploitative social order where the State has to rule the least, where man lives with the Nature in complete harmony and the individual and the community (collective) interests coincided. For this he made many experiments and endeavoured fervently by striving to create models that could be replicated. In his concept the village was the primary unit for such a system. Villages were to be ideal human habitats which afforded people to be close to each other as well as be in warm proximity with mother Nature and where physical, intellectual, emotional, cultural and spiritual development of the human spirit could be expected at its best. For this he did not want continuation of the present state of the villages which he agreed were like 'dung heaps'. His dream as per his words was, "when our villages are developed fully there will be no dearth in them of men with a high degree of skill and artistic talent : There will be village poets, village artisans, village architects, linguists and research workers. In short there will de nothing in life worth having which will not be had in the villages. Today villages are dung heaps, Tommarrow they will be tiny gardens of Eden where dwell highly intelligent folk whom no one can deceive or exploit. The reconstruction of the villages along these lines should begin now.) "Harijan Weekly, 10.11.46). The decentralized system of life - were self-sufficiency and co-operation are to be the key notes and simplicity, service and spiritual outlook are to predominate - is in a way just the opposite to the direction in which the present day world economy of competitive, export earning oriented, progressively centralized system is moving. Gandhi's path was to take us towards peace and harmony where as the other one towards strife and tension. To change the present system is not easy even in India as the current is strongly in the other direction. Gandhi's birth anniversary on October 2 is a reminder to us to see that the

(contd. on page no. 28)

from the labs

Low Cost Houses : The National Building Organisation has constructed a cluster of low-cost demonstration houses in Roopani village in Rajasthan, a desert area with extreme climatic conditions, at a cost of Rs. 5,500 each. Each house has a plinth area of 20.60 sq. m. which provides a room and covered verandah. The cost of construction is low due to the use of locally available materials. The houses have a foundation of coarsed rubble stone masonry over well-rammed and consolidated earth. For the walling also rubble stone has been adopted making use of only dune sand as binding material. Locally available stoneslabs have been utilised for the roofs and topped with lime plaster inside. For doors and windows 'Babool' wood has been used.

Blue Green Algae : In view of the spiralling price rise of petroleum based fertilizers (specially nitrogenous), the rice crop of India, stretching over 38 million hectares, needs an alternative. Biological nitrogen fixation system which can be done through the Blue Green Algae (BGA) is such an alternative. This BGA is most suitable for tropical rice fields, as it adds 25 to 30 kg of atmospheric nitrogen per hectare per cropping season. Beside, algae provides the crop plant with other useful organic substances like growth factors, vitamins, etc.

Based on the natural ecology of the elgae, a simple rural oriented open air method for their production in bulk has been developed at IARI (Indian Agricultural Research Institute), New Delhi. The starter culture, a soil based mixture of Aulosira, Tolypothrix, Nostoc, Anabaena and Plectonema is supplied by IARI. For production of BGA, shallow pits/trays 180 x 96 x 27 cm. lined with polythene sheets are made and filled with 10 kg soil mixed with 200 gms superphosphate. The pits are then filled with clean water upto a depth of 6 cm. After the soil settles down, sawdust and starter culture of BGA is sprinkled on the water surface in the pit which is open and exposed to sun. The growth is rapid and in about a week a thick algae mat is formed on the surface of the soil. Water is added intermittantly to compensate for loss due to evaporation. When the algae growth is sufficiently thick, addition of water is discontinued. The dried algae flakes from the surface of the soil are collected and bagged for use in the fields. The pits are again filled with water for a second crop of algae. The soil in the pit is renewed after every 3 to 4 harvests of BGA.

Agrowaste Compaction Machine : In the context of the world-wide energy crisis, it is imperative not only to conserve energy, but also to make the best and efficient use to combustible agricultural wastes which are abundantly available in rural areas. The crisis has had a crippling effect, especially on rural economy. Agrowastes like groundnut shell, chopped & screened bagasse, saw dust, agricultural straw, bamboo dust, coir pith etc. can be burnt more easily and efficiently if they are made available in compacted form. An agrowaste compaction machine has been developed under the National Research & Development Corporation, New Delhi. The machines has three versions—

i) Manually Operated Machine : It can produce about 40 kg of briquettes per day.

ii) Bullock Operated Machine : It can be operated by a single bullock and can produce 100-130 kg of briquettes per day (8 hours).

iii) Power Operated Machine : It has a capaciry to produce about 500 kg of briquettes per day. These briquettes can be used in the boilers of industries, thus minimizing dependence on coal whose production and distribution has become a national problem.

Biogas From Water hyacinth : Water hyacinth (Eichhornia crassipes), an obnoxious aquatic weed abundantly available in water-logged areas, has been tried as a feedstock for producing biogas with 50-60 methane content. The left-over sludge is a good manure with high nutrient contents and acts as a good soil conditioner owing to its fibrous nature, experiments made at the National Environmental Engineering Research Institute (NEERI), Nagpur, show that cattle-dung and water hyacinth, mixed in the ratios of 3 : l can yield 30% more than with cattle-dung alone.

Physical Resources Of Earth

Abstracted from the Coromandal lecture of 1985 on "Physical Resources of Earth and how Science can improve their utilization" by Prof. Sir Herman Bondi.)

Mankind has always depended on the physical resources of the world. Sunshine, air, fresh water and fertile soil are necessary for the production of food. To support us in acceptable comfort in our ever increasing numbers, many other materials have become essential, such as energy resources, (timber, coal, oil, gas, uranium), bulk minerals (sand, gravel, lime, roadstone), meta ores the flora and fauna crucial for the fertility of the land and the variety of tree species necessary for people's timber requirements. To this list we might add the animal life of both land and sea which supplies a important variety of food.

In general terms, a higher standard of living necessitates a greater use of resources. It follows from this that the economic advance of the less developed parts of the world - an advance greatly to be desired - cannot be envisaged without a marked increase in global resources use. There has been growing concern that prosperity, and especially the spread of prosperity, is at risk from resource exhaustion, a concern that become widespread after the 1973-74 oil - crisis. How serious is this danger ? What steps need to be taken to avoid or at least to minimise its impact ? What is needed above all is more knowledge, knowledge that enables us to understand the earth's resources better, knowledge which enable us to control the potential damage to our environment resulting from resource exploitation, knowledge to enable us to discover and use resources that may not always be easy to find, knowledge to improve further productivity and therefore utility to mankind of existing resources.

CLIMATE

It is beyond doubt, that the activities of fossil fuel burning and, to a lesser extent, of deforestation, are increasing the carbon-dioxide content of the air globally and are also adding noxious gases (mainly SO_2 and No) to large regions of the world. Any substantial growth in atmospheric carbon-dioxide will inevitably lead to a warming of the earth's climate.

Oil is the ideal energy source. It is easily and cheaply transportable, is capable of being converted efficiently into a large variety of different fields. Unhappily, there are good reasons to bebelieve that reserves of oil, especially of oil which is obtainable relatively inexpensively, are limited and that production of oil cannot be increased much and indeed is bound to decline easily in the next century. There is therefore a strong argument for all oil consumers employing utilisation devices of high efficiency and replacing oil, where practicable by other resources. We should note that all fossil fuels other than uranium contribute to atmospheric CO_2 and to nitrous oxides and that oil and coal also contribute to sulphur in the air. (The Hindu 16-12-85)

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"Under my scheme there will be more and better libraries, more and better laboratories, more and better research institutes. Under it we should have an army of chemists, engineers and other experts who will be real servants of the nations, and answer the varied and growing requirements of a people who are becoming increasingly conscious of their rights and wants. And all these experts will speak, not a foreign language, but the language of the people. The knowledge gained by them will be common property of the people. There will be truely original work instead of more imitation".

—Gandhi
9-7-38

Small Industries For Rural Areas

Mini Milk Chilling Unit: Major production of milk is in rural areas whereas the markets are in cities. This leads to degradation during storage and transport. These problems can be solved to a great extent by providing the farmers with small milk chilling units that operate on biogas, since most of the remote villages are not electrified and those that are electrified are often without power. In these circumstances milkchilling units based on biogas are most appropriate for boosting the production of much needed milk and for effecting 50% saving in fuel consumption by reducing the trips of milk collecting van from two to one per day. The NRDC in collaboration with School of Applied Research, Sangli, Maharashtra, has developed four designs of mini milk chilling units of capacity 500 litres and 1500 litres.

ALTERNATINE TO OIL MILLS

(V. K. Desai - of Tinytech Plants, Rajkot)

Before about 40 years, there existed about 300,000 traditioned bullock drawn oil ghanis in India which were the sources of obtaining pure and fresh edible oil in the country. But with advent of industrial age after independence, hundreds of big oil mills emerged in the name of industrialization, and families running oil ghanis lost their livelihood.

But recently industrial policy of Central Government seems to be favourable to the decentralized industries - at least for ebible oil industry and tiny oil mills appropriate to the requirements of our villages have started emerging. As now electricity is available in most of the villages, electric driven tiny oil mill can be conveniently established in every village. Thus again, edible oil industry can be decentralized in the villages by establishing about 100,000 tiny oil mills.

Tiny oil mill employs modern technology of oil extraction. i. e. decorticator, screw type expeller, filter press, boiler, plunger pump for filter etc., and entire mill is driven by 7.5 H. P. or 10 HP electric motor.

It is covered under bankable scheme and loan, and subsibly is made available for establishing this cottage industry in villages. Capacity of this tiny mill is 15 kg. of oil (one tin) per hour for groundnut.

Working for 10 hours a day and 200 days in a year, it can crush in a year 100 tons of groundnut, and earn as much as Rs. 39 000/- per year and in one year itself pay back the entire investment. But practically, such tiny oil mills are more likely to run on job work basis, i. e. oil miller will charge only crushing expense which will contain his profit also, any oil and cake will be returned to his customer. Hence, benefit will be distributed among oil miller, farmers and customers, resulting in ultimate prosperity to that village.

Tree Leaves - An Alternate Fuel

Various agricultural wastes have been suggested as renewable source of fuel. However the leaves available abundantly in the forests can also form a good renewable source of energy provided a suitable technology is made available.

The collection of leaves, their storage and transport etc. pose problems which have to be overcome to make the leaves suitable as domestic fuel. The Krishi Viswa Vidyalaya, Jabalpur has developed domestic fuel from tree leaves.

A simple rake type collector that can be made of bamboo or mild steel has been designed and fabricated. Using this a man can collect about a quintal of leaves in one hour.

To enable better packing of leaves for economical transportation a manually operated leaf crusher to probuce small pieces, right at the collection spot, has been designed and fabricated. This machine can crush 60 to 100 kg. of leaves per hour and weight only about 15 kg.

The crushed leaves are mixed with desired extruder type pelletiser which produces tubular pellets, 3 cms. in dia and 7 to 12 cms long. The machine operated by a 3 H. P. electric motor has a capacity of 100 kg. of pellets per hour.

The pellets are then sun dried in the open, Pellets made of mixture containing leaves and clay ratio of 1:2 were found to possess good burning characteristics. Pellets from leaves alone, have greater calorific value but in a sigri they burn away too fast. (N.R.D.C.) ▣

World's Quiet Crisis–Soil Erosion

(People now know of oil crisis but not of soil crisis. Here are the facts-Editor)

Over the past generation world food output has more than doubled, when little new land was brought under the plough. But Agricultural practices that boosted food production have also led to excessive soil erosion. Population growth and rising affluence, spurs world demand for food higher each year. Soil erosion is accelerating. Though soil erosion is a natural process, one that is as old as the earth itself, today it has increased far exceeding the natural formation of soil. World is beginning to mine its soils, converting a renewable resource into a nonrenewable one. Crop surpluses are partly the product of mining soils.

Through out the Third World, farmers are pushed onto steeply sloping, erosive land that is rapidly losing its topsoil. Farmers have abondoned ecologically stable, long-term rotation, including hay and grass, as well as row crops, in favour of the continuous row cropping of corn or other crops. The loss of topsoil affects the ability to grow food in two ways. It reduces the inherent productivity of land, both through the loss of nutrients and degradation of the physical structure.

When farmers lose topsoil they may increase land productivity by substituting energy in the form of fertilizer, or through irrigation to offset the soil's declining water absorptive capacity.

It is a quiet crisis, unlike earthquakes, volcanic eruptions or other natural disasters this humanmade disaster is unfolding gradually. Often the intensification of cropping patterns and the plowing of marginal land, lead to short-term production gains, creating an illusion of progress and a false sense of security.

Over most of the earth's surface, the thin mantle of topsoil on which agriculture depends is six to eight inches thick. Although the depletion of this thin layer of soil may compromise economic progress and political stability even more than dwindling oil reserves, nowhere has the depletion of topsoil gained the attention paid to the depletion of oil reserves. Fifteen years ago, the public was largely unaware of the rate of oil depletion, but that changed with the oil price hikes of 1973 and 1979. Such a procedure dose not exist for world soil reserves. Indeed, not until topsoil has largely disappeared and food shortage have developed or famine threatens, does this loss become appearent.

we do know that if the current rate of topsoil loss through erosion cotinues there will be a sharp reduction in the amount of topsoil available by the end of the century. Largely because of population growth, we project a 19 percent decline in cropland per person between 1984 and the end of the century. But our projections of the amount of top soil per person, assuming current rates of soil erosion if continues, shows a decline of 32 percent from 1984 to 2000.

The increase in soil erosion over the past generation is the result of the pressures on farmers to produce more. In an integrated world food economy, the pressures on land resoures are not confined to particular countries, they premeate to the entire world. Many traditional agricultural systems that were ecologically stable as recently as mid-century, when there were only 2.5 billion people in the world, are breaking down as world population moves toward 5 billion. Through out the Third World increasing population pressure and the accelerating loss of topsoil seem to go hand in hand. It is this vicious cycle, set in motion by the growing human demands for food, feed, fiber and energy, that makes mounting an effective response particularly difficult.

Another source of soil erosion in recent years has been the shift to larger farm equipment. The shift to large-scale equipment, has often led to the abandonment of field terraces constructed to reduce runoff on sloping lands. In dry land farming regions, tree shelter belts that interfere with the use of large-scale equipment have also been removed. The enlargement of fields to accommodate huge tractors and grain combines also reduces border areas that have traditionally served as checks on erosion.

This transformation of agricultural practices has been fueled by the growing demand

and by the availability of cheap chemical fertilizer. Demand growth in turn, has been amplified by population growth that has hastened the deterioration of traditional agriculture in many countries. As a result, agricultural systems throughout the world are now experiencing unsustainable levels of soil loss.

Dimension of the Problem

World soil erosion geologist Sheldon Judson, estimated in 1968 that the amount of river-borne soil sediment carried into the ocean had increased from 9 billion tons per year before the introduction of agriculture, grazing, and other activities to 24 billion tons per year. His estimates indicate that humans have become an important geologic agent, accelerating the flow of soil to the oceans. Hydrologists estimate that on average one-fourth of the soil lost through erosion in a river's watershed actually makes it to the ocen as sediment. The other three-fourth is deposited on footslopes, in reservoirs, river foodplains or other low-lying areas, on the riverbed itself, which often causes channel shifts. The Ganges of India deposits 1.5 billion tons of soil into the Bay of Bengal each year. Scientists have recently documented that vast amounts of wind-borne soil are also being deposited in the oceans as sediment. Recent satellite photographs, indicate clearly that large quantities of soil dust are being carried out of North Africa over the Atlantic range from 100 to 400 million tons annually.

Indiai s one of the fewcountries to compile a national estimate of soil loss, In 1975, Indian agricultural scientists collected data on local soil erosion from each of the reasearch stations in the national network maintained by the Indian Council for Agricultural Research. Using these figures, they estimated that 6 billion tons of soil are eroded from India's croplands each year. From this and from an estimate that 60 percent of the cropland is eroding excessively, the excessive topsoil loss can be calculated by substracting from the total a tolerance level of five tons per acre. This yields an excessive topsoil loss from Indian cropland of 4.7 bllion tons per year more than twice the U. S. level.

Alltogether, the excessive loss of topsoil from crop-land in the four major food producing countries viz. U. S., U. S. S. R. India and China which have 52 percent of the world's cropland and account for over half of its food production, is estimated at 13.2 billion tons per year. Because of shortsighted way one third to one-half of the world's croplands are being thus managed, the soils on this lands have been converted from a renewable to a nonrenewable resource. Assuming an average depht of remaning topsoil of seven inches, or 1, 120 tons per acre, and a total of 3.1 billion acre of cropland, there are 3 5 trillion tons of topsoils with which to produce food, feed, and fiber. At the current rate of excessive erosion, this resource is being depleted at 0.7 percent per year -7 percent each decade. In effect, the world is mining much of its cropland, treating it as a depletable resource, not unlike oil.

The Erosion of Productivity

Whenever erosion beings to exceed new soil formation, the layer of topsoil becomes thinner eventully disappearing entirely. As the topsoil layer is lost, subsoil becomes part of the tillage layer reducing the soil's organic matter tilth, and aeration, and adversely affecting other structural characteristics that make it ideal for plant growth. This overall deterioration in soil structure is usually accompanied by a reduced nutrien retention capacity, which lowers productivity further. Additional chemical fertilizer can often compensate for the loss of nutrients, but the deterioration of soil structure is difficult to remedy.

The Global Balance Sheet

A world food demand had begun its second doubling since mid century, pressures on land have become so intense that close to half the world's cropland is losing topsoil at a rate undermining its long-term productivity. Eager to maximise food output today, we are borrowing from tomorrow. The loss of over 25 billion tons of topsoil from our corpland each year is the price we pay for shortsighted agricultural policies designed to boost food output at the expense of soils, and of failed or nonexistent population policies.

HEALTH TIPS

Cold Water Cures burns

In Bombay, more than 1200 cases of burns are reported annually. Delhi over a two day period around Diwali in 1983 showed that 2.6 per. cent household reported mishaps.

Dr. Manohar H. Keshvani, Secretary, Burns Assosiation of ndia says " Around 75 per cent of burns accidents occur at home, mostly in rhe Kitchen, mainly invoving women and children. Scalds are the commonest type of domestic burns. Increasing use of cooking gas and electricity in the kitchen accounts for an increase n the incidence of burns mishaps. Fireworks during Diwali season also constitute a major constributory actor with a dangerous damage potential."

The severity of the burn is udged more by the extent of he burns rather than by the lepth of the damage. Those coveng less than 5 percent of the ody's surface are minor injuries; hose of more than 10 per cent f the surface areas are hardzardous n all age groups but especially n the young and the very old. urns over 30 percent extent are ery serious.

By using the ' Rule of News' e area of burns may be readily timated the head and neck toether are 9 percent, the two oper extremities 9 percent each, e lower extremeties and the front d the back of the trunk are ch 18 per cent. A simple ready ckoner is the burned person's nd the surface. of the palm of e hand is equal to 1 per cent the body's surfece.

Pouring cold water over a burns victim is the best way of putting out flames, as well as cooling burns skin thus relieving the patient. Nothing should be applied on the wound. Wrapping buring person in a blaket and smothering fire by asking him to roll on the floor will not cool the victims body. If anything it will trap the flames inside and help to further heat the damaged skin causing irreparable and irreversible damage to cells. Rapid cooling not only prevents further damages but helps to revive moribund cells. Application of cold water produces blisters which is a good sign and indicates that the injury is not too deep and can be healed in a short time. The blistered skid protects the underlying surviving cells and should not be removed Burnt clothing is relatively sterile compared to cleaner looking unburnt clothes and heance change of clothes is not called for. Removal of burnt clothing will only serve to expose the burnt portion to infection. Also the deeper the burns the less painful they are· A severely burnt patient must be transported to a hospital burn center as soon as possible after the accidents, in a recumbent position to minimise shock. The correct treatment--cold water is hardly used. Some times even the general medical practitioners do not know the correct line of treatment. The public at large is ignorant about the use of cold water as immidiate burn control.

– D. K. Dixit

CARD FOR DETECTION OF MALNUTRITION

During recent years growth monitoring per se has been regarded as a strategy of preventing severe malnutrition and death in children. Tools for meauring growth are simple and easy to use (weighing scale, measuring tape etc.) and are available in a community/ Family. However, no tool is available at present wich may be simple, small portable and easy to use for interpretation of anthropometric measurement collected at peripheral level. The K. G. A. T. Card has been developed to fulfi- this need.

K. G. A. T. card is very easy to operate. Just adjust the age of your child [up to 60 months] on the respective window of the card, you will get instantly the minimum expected weight (in kg), height (in cm) and mid upper arm circumference [MUAC in cm]. And if these values are less than the critical values (which are also shown simultaneously against each parameter i. e., weight and MUAC, it warns tnat your child is suffering from severe malnutrition. Alternatively, by adjusting the height (in cm) of your child on the KGAT card, you get the instant minimum expected weight for this height along with the critical value which indicates severe malnutrition. If your child's nutrition status is between normal and severe category of nutrition, it means he is suffering from mild to moderate degree of malnutrition. Different criteria used to interpret anthropometric measurements. in terms of manutrition have been shown in the card.

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Agri Snippets

CROPS ON SALINE WATER

FARMERS of Turkmenia (Soviet Central Asian Republic) can now grow crops on saline water. The method has been recommended by scientists studying the problems of salined soils. An experiment was carried out in the course of five years in experimental cotton, lucerne, maize and eggplant fields. The crops grown on such field were not worse than usual ones.

Many agricultural plants can feed on saline water if salt concentration in it is not more than five-six grams per litre. Cotton can also grow on saline water with a concentration of up to three grams. It is precisely the concentration of salt in the water from the irrigated field of Turkmenia, which are periodically flushed.

The new method will be used in the Kara Kum Canal zone, which has moved towards the Caspian Sea at the rate of nearly 40 Kilo metres a year since 1954.

IRRI - RICE TRANSPLANTERS

The machine, which was recently released by IRRI to the manufacturers, is a five-row seedings. The machine consists of a wooden skid a main fram assembly, pivoted picker arm assembly and the handle assembly.

As the handle is pushed down, the pickers move towards the feeding frame slots. picking small clusters of seedling and continue on a downward path to reach the puddled soil. The handle is then pulled back towards the operator as he moves backward, thus, leaving the seedlings standing in the soil. Each time the handle is pushed downwards, the pawl and chain indexing assembly is activated, moving the seeding tray sideways. The wooden skid provides for the floatation. Simple adjestments for the number of seedings per hill and depth of planting are provided. The machine weighs 25kg., works well in 1 to 10 cm water depth costing Dollar U.S. 200. For details contact: Agricultural Engneering Department, International Rice research Institute, Los Banos Laguna 3720. Philippines.

Ajawan

Ajawan is a bushy plant belonging to the Coriander family (Umbelliferae) yields an aromatic grain of great medicinal value. In English the plant is refferred, as "Bishop's weed". An extract of the seeds is generally recommended to correct digestive disorders.

A hardy crop of four-month duration 'Ajwan' has a close resemblance to coriander plant and even the inflorescence is strikingly similar. It is very difficult to differentiate between the two when seen from a distance. Ajawan grows to about 50 cm in height whereas coriander grows to about half its height.

"The crop stands drought conditions well and it thrives well with just two three rains to give good result", said Mr. G Pullanna, a small farmer of Chanugondla village, it comes up well in the black cotton soils of Kurnool district and it easily fetches handsome returns upto Rs. 5,000 per hectare, according to him.

About 25 kg of seeds (about the size of mustard and resembling coriander in its look) are drilled in lines 30 cm apart immediately after the first rains in July-August. Normally, liberal application of farmyard or alternatively sheep pens are allowed in the the fallow fields to get the organic manure.

About 126 kg complex fertiliser is added to the crop with the last ploughing, and the dry crop needs no further manuring.

Seeding is the major cultural operation, and two to three hand weeding are done usually. 'The only major pest, a leaf eating semilooper is controlled by spraying Rogor. Particular care should be taken to avoid this insect pest duriug the flower state it affecs the yields considerably.

In December, the crops come to harvest, and the harvesting time is indicated by the yellowing of the green foliage and the earheads turning to brown. whole plants are pulled out from the field, and they are dried in direct sun for about four days. They are then threshed and cleaned before bagging and marketing.

A good crop of ajawan will yield up to 7.5 quintals from a hectare, and average yields range between 4.25 to 5 quintals only," said Mr.Pullanna. The cost of cultivation will be around Rs. 1,250 and the returns are largely decided by the quantity of the produce, the ruling market price ranges rom Rs. 1000 to 1500/quintal.

* *

Energy News

Temple Gas

In Shiralimath, North Kanara near Bhatkal (Of Chitrapur Saraswaths), a biogas plant was installed many years ago. It supplies gas for all the needs of the temple throughout the year. The biomass waste is used in the vegetable garden, which supplies the needs of all the vegetable to the Math, as well during the Rathotsava when thousands of people visit the Math for many days.

(The Hindu, June 1985)

Masudpur - The Energy Village

Masudpur village on the southern skirt of Delhi symbolises the new era of non-conservative and renewable sources of energy with its biogas plant, wind mill, lighting system operating on solar energy. This renewable energy project was commissioned under the integrated renewable energy systems in collaboration with Khadi & Village Industries Commission.

These projects were undertaken within the framework of Commission for Additional sources of Energy (CASE).

The problem of women to ease themselves and cattle waste in abundance caught the attention of CASE Scientists to find some solution which could help them in more profitable ways. They set up a biogas plant system to utilise animal and human waste.

This provided half the total number of families with gas connections. It is thought that gas supply might be extended in due course. Light through photovoltaic cells supplied by the Central Electric Ltd.; Sahidabad, produces 280 W electricity. They have encouraged the villagers to use solar cookers for cooking vegetables and rice.

Masudpur Scheme is one of the 310 successful projects conducted by CASE in 93 districts.

First Indian Solar Furnace :

The first solar furnace in India has recently been designed and fabricated by the Indian Institute of Science, Bangalore. The four meter diameter furnace can yield the maximum temprature of 1, 190 °C at the center of focal region. Thus this solar furnace can be used for melting and casting of metals having melting points up to 900 to 1000° C at the center reports Industrial Times.

It can be advantageously put to several industrial applications. It has been found that the castings produced using solar meted metals exhibit freedom from such gas porosity and possess superior mechanical properties compared to conventionally melted metals. The power and heat available at the focus of the solar furnace can also be used for non-metallurgical uses such as steam generation, power production and processing of plastics. This holds promise for the use of solar furnaces in small industries and rural workshops.

(Nagpur Times : 6 Sept. 85)

Wind Farm Project Soon :

The wind farm project in Palayakayal village near Tuticorin expected to be commissioned by the end of November. The wind farm will comprise ten Denish-built windmills, each with a 55 KW generator and that this 550 KW power bank will be able to generate up to one million units of energy in a full year. The windmills are being set up as part of the Department of Non-Conventional sources of Energy's plan to establish demonstration projects in Gujarat, Maharashtra, Orissa and Tamilnadu.

(The Hindu, July 31, 85)

Biogas in China

Experiments in Sichuan, Hubei Jiangsu, Guangxi, Hebei, Liaoning and Heilongjian provinces in the cooler regions of China show that new technology enables an eight cubic meter biogas pit to generate 1.09 cubic metres of biogas every day in winter as against very little or no gas at all by using ordinary method.

Even in the sub-zero tampratures of Heilongjiang and Liaoning provinces, daily gas generating capacity runs around 0.6 to 0.8 cubic metres.

The new technology was developed by the Chengdu Biogas Research Institute. To popularize the new methods, directions for mixing up ingredients of different densities have been prepared for users.

The institute has developed a number of new technologies including the anaerobic fermentation techology.

The use of biogas in China's rural areas begun in the 1970s. More than four million biogas pits are in operation.

It is estimated that 100 million rural people will be using biogas for cooking, Lighting and other purposes by 1990.

(China Daily (China) Date : 20. 12. 1984.)

GEDA News In Brief

▣ GEDA has distributed total 8875 Solar Cookers all over Gujarat stete,

▣ GEDA has undertaken a new scheme to provide community solar cookers to various schools for their mid-day meal programme. Under this scheme 42 community solar cookers will be disrtibuted to various schools, before April-1985. Training has been given to the cooks for cooking meals, in the community solar cooker.

▣ Total 43 demonstrations have been held in Pachmaoal, Surendranagar, Kheda districts 'under Cookers Demnostration Programme'. 76 Competitors have been registered for 'Solar Cooker Design and Prototype Development Contest.

Total seven dealers for solar cookers haye been appointed for distributing solar cookers in Gujarat.

▣ The Home science Faculty of M. S. University of Baroda has prepared about 110 recipies which can be cooked in solar cooker and GEDA is planning to bring out a recipe book. First issue of the solar cooker news letter in Gujarati has been published by Documentation Centre, GEDA and it will be distributed among all the customers of solar cookers. GEDA has sanctioned installation of solar hot water systems of total capacity of 572, 607 1pd at an estimated cost of Rs. 2.24 crores at different places in Gujarat.

▣ Application for subsidy on Domestic hot water systems have been sanctioned by GEDA, out of which 37 systems have already been installed.

▣ GEDA is installing 1600 solar stills at various educational institutions, hospitals, laboratories, Gujarat State Road Transport Corpn, etc. These stills can save 1.5 lacs of KWH units of electrical energy every year.

▣ A 10 ton solar powered cold storage plant at Chhani has been loaded with 70 tons of potatoes.

▣ 6 nos. of Solar PV street lights, one pump set and one TV-Cum lighting system have been alloted to village Melakadi, Dist. Bhavnagar. Street lights have already been installed.

▣ Under National wind Mill Programme- total 62 windmills are installed at various places and order has been placed for another 33 windmills which will be installed shortly.

▣ Under GEDA wind Mapping Project 20 sites have been selected for installations of anemometers. Under GEDA-DNES Wind Mapping Programme 10 sites have been located for collecting wind speed data.

▣ VESTAS 55/11 KW Wind Turbine Generators will be installed at Veravel to study the performance of the machine in Gujarat (oastal conditions. The tripartite agreements have been signed by GEDA/GEB & RRB Consultants. The total project cost will be Rs. 15.5 Lakhs.

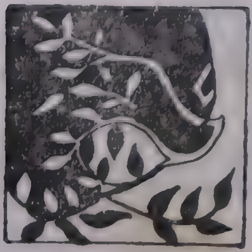
Two experimental 4.0 and 3.5 KW "Polenko" wind genarators are under erection near Veraval. DNES, GEB & GEDA are putting up a 0.5 MW Wind farms at Okha, with a total cost of more than Rs. 1 crore.

Under the National Project on Demonstration of improved Chullahs, five training programmes have been installed in the villages Jethapura, Khansol, Santokpura and Bajipura of Kheda Dist.

DNES has sanctioned 21 community / institutional Biogas Plants. Out of these construction of five biogas plants have already been completed and others are under various stages of constructions. GEDA has participated in Exhibition organized by Gujarat Agriculture University, Anand during 17th to 22nd January 1985 and exhibited solar cooker, PV lighting systems, water pumping windmill etc.

GADA has also participated in Science Fair at Modassa which was organized by Government Technical Cum Commercial Centre during 24th to 28th January 1985 and exhibited various renewable energy devices, charts, posters, etc.

Ecological Problems



Killer Pesticides : One farmer dies every hour from pesticide poisoning in developing countries, the United Nations Food and Agriculture Organisation (FAO) has said in a recent report. Each year 10,000 people died and another 375,000 were stricken by pesticide poisoning, the FAO said. According to the FAO, the danger of unsafe use of pesticide is know at the government level, but many developing countries do not have the mechanism to regulate their sale and use. The FAO is introducing an international code of conduct on the distribution and use of pesticides, in which it will ask manufaturers to assume responsibility for safe distribution and use of pesticides.

(Times of India).

Ecology Problem Related To Trade

A Survey said that OECD countries are responsible for 60 per cent of the total atmospheric pollution generated by man - 77 per cent of carbon monoxide emissions, 54 per cent of nitrogen oxides, 50 per cent of sulphur oxides and 27 per cent of particulate matter.

Within the OCED area, North America accounts for a higher proportion than Europe, which in turn generates more air pollution than the Pacific countries, not only in absolute volume but also in tonnes per dollar of GDP.

(The Times of India, 2 July 1985)

The Race for Legs

India exports 70 million frogs an year. As the frogs are caught, they are dropped into gunny sacks. Between 100-300 may be bundled in to the gunny sack before being taken to the collecting centre. 20% may be dead when they arrive at the factory after having been dumped and crushed for 10 hours or more in the gunny sacks. Some are skinned alive, the leather being used for watchstraps and purses. The majority are cut into two through middle by being thrust against a fixed carving knife.

Apart from curelty, lack of food hygiene causes concern. Flies settle thickly onto the cut legs. The ice that they are packed in is local water often unfit for drinkig.

WWF calls for a ban is timely and neccessary. to prevent ecological disaster in exporting Asian countries.

(Asian-Pacific Environment Newsletter, March 85)

The 1500-Miles-long Ganges Will Benefit From a Five Year, $ 250 Million Government Cleanup Plan

The work will include constructing or modernizing sewage treatment plants in 27 cities along the river with populations greater than 100,000. When complete, the plants are also expected to produce methane and sluge-based fertilizers. 80% of the wastes, discharged into the Ganges is from human and animal wastes, with the rest from industrial plants and agricultural runoff, by the end of 1990, pollutants discharged into the river should be reduced by 75-80%.

(Source : International Water Report' Summer 1985)

CART On The Move

Council for Advancement of Rural Technology (CART), under the Ministry of Rural Development, has been accting as a catalyst and focal agency for development of technology, appropriate for the rural areas, by identifying and funding research and development efforts by different organisations. Following is a list of various projects funded by CART, along with names and addresses of the respective organisations sponsoring the projects.

Centre of Science for Villages, Wardha (Maharashtra)	1. Studies on fabrication of low-cost biogas digesters using red clay and other clays. 2. Training programme for transfer of five tested rural tecnnologies to voluntary agencies.
Central Glass & Ceramic Research Institute, Jadavpur, Calcutta.	1. Development of low-cost and low-thermal mass furnaces for rural potters. 2. Diversification of products and introduction of improved technology in pottery industry in Bankura district, West Bengal.
Society for Development Alternatives, New Delhi.	Rural shelter development of low cost housing packages.
Centre for Water Resources Development and Management, Koshikade (Kerala)	Demonstration of micro-irrigation and fertilization techniques for economic high value crop production in water deficient areas.
Gramodaya Sangh, Bhadrawati. (Maharashtra)	Vitreous red clay flooring tiles.
Shri Murugappa Chettiar Research Centre, Madras.	High Density Poly Ethelene Plastic boat building, training and demonstration for small fishermen.
Centre for Bio-Medical Engineering, IIT, New Delhi.	Safety of agricultural implements.
Department of Science and Technology, Jaipur, Rajasthan.	1. Provision of appropriate means of transport in desert, off-the-road areas in Rajasthan. 2. Removal of processing of wool in rural areas of Rajasthan.
Society for socio-economic emancipation and village autonomy, Manika, Palamu district, Bihar.	Bonded labour of Palamu - a technological intervention.
Centre for Science, Education & Research, Pabal, Pune, (Maharashtra)	Science & Technology programme for rural youth.
Vikas Bharati, Bishunpur, District Gumla (Bihar)	To evolve an appropriate and integrated technological system for a sound network of village industries in tribal region.

Rural Technology Institute, Gujarat.	1. Pottery demonstration-cum-training. 2. Project for flayers, tanners and desi footwear makers.
Social Work & Research Centre, Tilonia (Rajasthan)	Autonomous solar ligthing for night schools in Silora Block, Rajasthan.
Department of Science and Technology, Government of Andhra Pradesh.	Electrification of tribal villages by photo-voltaic system.
Asian Institute for rural Development, Banglore.	Dissemination af wood-burning improved cooking stove in Karnataka.
UP State Council of Science and Technology, Lucknow.	Design, development and extension of improved water-mills in Garhwal and Kumaon hills of U. P.
AP Khadi & Village Board, Hyderabad.	Briquetted fuel manufacturing plant.
Rural Development Centre, IIT, Kharagpur.	Establishment of centres of mutual training-cum-rural technology demonstration.
Centre for Rural Development, IIT, Madras.	Development of improved technologies for establishing rural industrial crafts projects.
Indian Institute of Public Administration, New Delhi	Survey of economic viability and organisational requirements of liftirrigation technologies for small and marginal farmers.
Appropriate Technology Development Association, Lucknow (U. P.)	Increasing efficiency in gur industry in rural areas of U. P.
Central Mechanical Engineering Research Institute, Durgapur	Development of appropriate technology and its application in the fishing hook industry in Bankura District, West Bengal.
MP Council of Science & Technology, Bhopal, (Madhya Pradesh.)	Impact of science & technology inputs on village development.
Mitraniketan, Trivendrum.	1. Rural technology demonstration-cum-training-cum replication centre, 2. Treatment of coconut thatch for longlvity.
Prakriti Samrakhshana Samiti, Trivendrum.	Revitalization of a tribal habitat through technology transfer and eco-restoration.
Centre for Rural Development and Appropriate Technology, IIT, New Delhi.	1. Study of the growth charecteristics of sarkanda grass and development of technology for its utilization. 2. Field trials for selected processing technologies to create employment for rural women.
Action for Food Production, (AFPRO), New Delhi.	1. Demonstration-cum-study of Deen Bandhu biogas plants. 2. Design modification and wilder application of bullock operated irrigation-pump set for small and marginal farmers.
NIRD, Hyderabad, (A. P.).	Studies on commercial utilization of low power technology : Briquetting of agro-waste for cooking fuel.
Cania Unnayan Committee, District Puri, Orissa.	Metal craftmen of Orissa : A technological intervention.

(Contd, on page No 23.)

SUN-DRIED MUD BRICKS

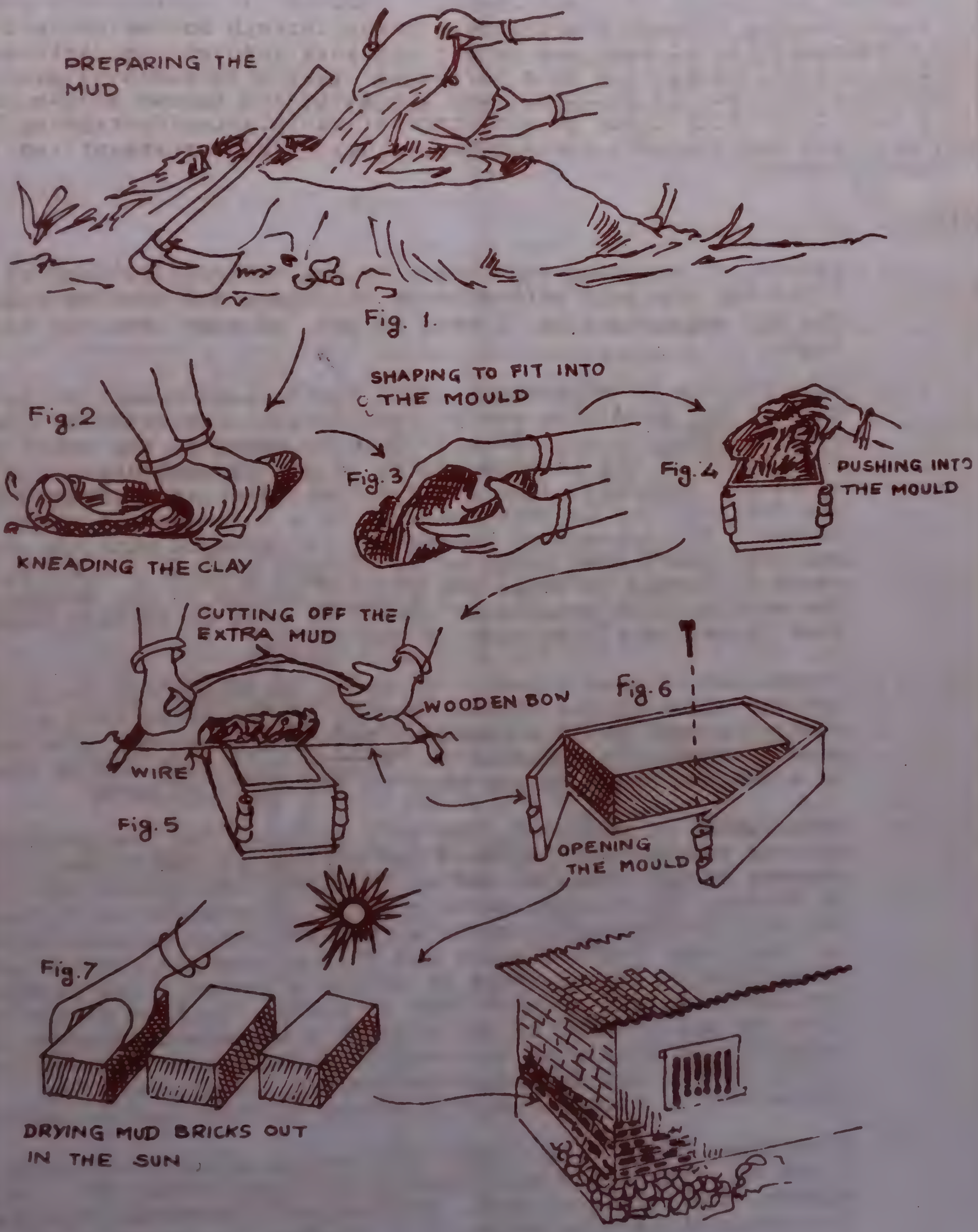
Description: Bricks (without being fired) made of mud and dried in the sun can go a long way in providing strength and safety to the traditional mud walls which are mishaped and weak, a common feature of our villages. A simple technique of making compact mud bricks with a wooden hand-mould can enable four women to produce about 5,000 bricks in a week's time and thus provide useful employment, and good housing material for the village.

Materials: Clay, sand and a rectangular wooden frame or mould with no top or bottom and a bow-cutter.

Process: Digging and preparing the clay:- Remove the top soil before beginning to dig out the clay to avoid getting roots and pebbles mixed in the moulding clay. Break up large lumps, if any, of clay, put the clay into a pit, called the tampering pit, using a bucket to measure the amounts to be mixed with water (Fig. .1). Use a rake to spread the clay into even, flat layers, no more than 8 cms deep. Add water to each layer of clay in proportion to the amount of clay to be mixed. A ratio of 3:1 (clay: water) is the approximate amount but this will vary according to the quality of the clay. In the morning the clay should be ready for moulding. If further mixing is required, tread the clay with bare feet for a few minutes.

Mud-brick formation: Take handfuls of wet clay from the tampering pit and place it on a flat clean ground. Make sure that a supply of dry, fine sand is handy and that the brick mould is well dusted inside with it before starting the brick-making. To make the first brick.(Fig. .2) take one of the clay balls and flatten it into a roughly rectangular shape. Dust one side of the clay with sand and turn the piece over so that it is sand-side down. Take another clay ball, place it at one end of the flattened piece of clay and fold it over to form a wedge shape (Fig. .3). Roll both sides of the wedge in sand and throw the clod forcibly into the mould (Fig. .4), ensuring that the sides are not cut as the brick goes into the mould. Cut the excess clay from the top of the mould with a bow-cutter (wooden bow with a wire) and drop it sand-side down (Fig. .5). Now unscrew the mould (Fig. .6) and keep the mud-brick out in the sun for drying (Fig. .7); when fully dry, the brick is ready for house construction purposes (Fig. .8).

SUN-DRIED MUD BRICKS


PREPARING THE MUD
Fig. 1.
Fig. 2
KNEADING THE CLAY
SHAPING TO FIT INTO THE MOULD
Fig. 3
Fig. 4
PUSHING INTO THE MOULD
CUTTING OFF THE EXTRA MUD
WOODEN BOW
WIRE
Fig. 5
Fig. 6
OPENING THE MOULD
Fig. 7
DRYING MUD BRICKS OUT IN THE SUN

WATER-PROOFING OF SMALL IRRIGATION CHANNELS

Description: Indians mainly depend upon open earthen channels for conveying water for irrigation of their fields. However, a considerable quantity of water passing through the channels seeps through on the way and is wasted. Permeability of soil can be considerably reduced when soil is mixed with a small percentage of a particular type of bituminous material. The technique consists of applying over the sides and bottom of the channels, a half inch thick layer of a mixture of mud plaster containing bituminous material and allowing the plaster to dry. This treatment can last six to eight years.

Process

(i) Removal of existing vegetation in the waterway is done by loosening the soil with a spade or plough and then manually The old embankment of 12 inch height, becomes about 18 inches high.

(ii) Construction of embankment: The resistance of soil to settlement in wet condition can be considerably increased by compaction (Fig. .2). This is done by removing the upper 9 inch layer of the loosened earth of the old embankment to the sides and compacting the lower 9 inch layer at optimum moisture (neither too dry nor too wet) to a thickness of about 6 inches. The process of compaction is repeated with the remaining soil stacked at sides so as to have a total thickness of about 12 inches at sides and about 8 inches in the middle. The width of the embankment should be such as to have about 6 inch flanks on either side of the channel.

(iii) Prevention of weed growth: To avoid the growth of weeds the bed and sides of the channel should be sprinkled with a solution of a weed-killing chemical before plastering. One such readily available chemical is 'Fernoxone' which can be applied in a concentration of one part in 300 parts of water.

(iv) Preparation of plaster: The soil selected for the preparation of puddle (same as used for plastering mud houses) should possess enough cohesion and at the same time should not crack on drying. To further avoid cracking of plaster on drying, the soil is thoroughly mixed with wheat straw or rice husk (2 kg. per cubic foot of soil) and then allowed to rot for about seven days in the presence of excess of water. The puddle is frequently worked up with feet or spade. An hour or two before the application of mud plaster a bituminous mixture is added to the puddle at the rate of about 4 pounds for every cubic foot of dry soil used for making the plaster. The entire mix is then thoroughly worked up with feet or spade.

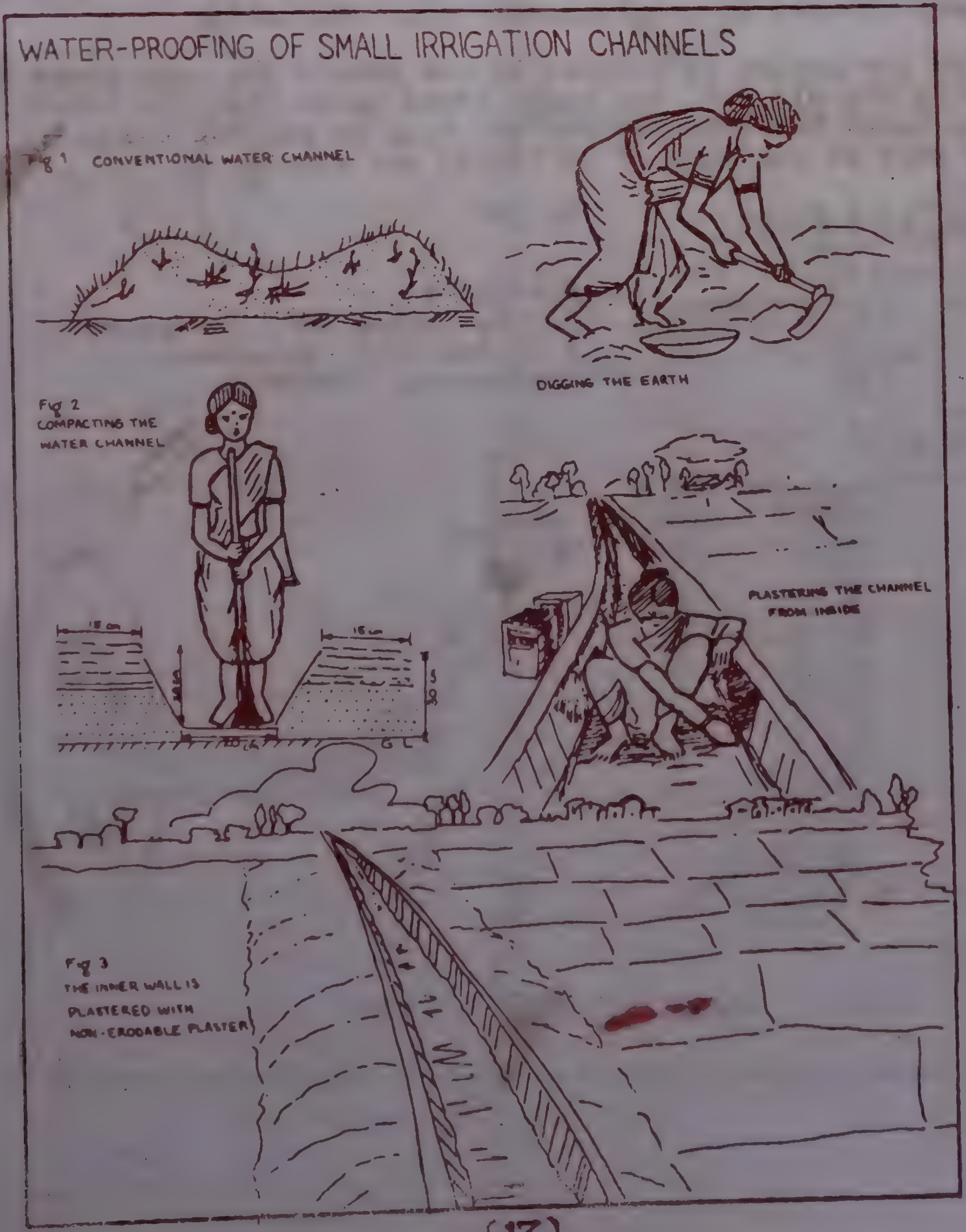
(v) Finishing: Hair-line cracks may develop after the plaster dries up. These can be closed by the application of a thin slurry, consisting of soil, cowdung and bituminous mixture in the ratio 15:15:1 by weight. If cowdung is not available, the concentration of bituminous mixture can be increased 1½ times (soil: bituminous mixture = 10:1). After the plaster has dried for about a week, the channel is ready for use.

(vi) Any damage caused by rains or animals can be repaired by plugging the damaged portion with the plaster originally used.

A semicircular channel to convey discharge of 5500 gallons/hour (0.25 cusec) should have 12 inch diameter and 6 inch depth.

Every 100 cubic feet of soil collected for making the plaster can cover an area of 2100 sq. ft. to ½ inch thickness and is sufficient for plastering 1100 feet of the channel.

Approximate Price Range:	Cost per 100 running feet - Rs 100 to Rs 150
Source:	Central Road Research Institute, Mathura Road, New Delhi.


WATER-PROOFING OF SMALL IRRIGATION CHANNELS
Fig 1 CONVENTIONAL WATER CHANNEL
DIGGING THE EARTH
Fig 2
COMPACTING THE WATER CHANNEL
15 cm
15 cm
GL
PLASTERING THE CHANNEL FROM INSIDE
Fig 3
THE INNER WALL IS PLASTERED WITH NON-ERODABLE PLASTER

KNOTTED ROPE PUMP

Description: The knotted rope pump is the simplest of pumps which is nothing but a knotted rope going through a pipe. It raises water from a depth of 17 to 20 metres, drawing 20 litres of water every minute or 1200 litres of water every hour. It is made with locally available material and local skills. A 36 metre long and 2 cm thick rope, takes 6 man days or so to make into a rope pump.

Materials: A rope (36 m. long, 2 cm. thick) PVC pipe (12 m. long, 2 cm. thick), wooden pulley with handle.

Construction: Take a rope (preferably nylon) and tie knots every 25 cm. throughout the rope length (Fig. 1). Slide the knotted rope through the PVC pipe as shown in Fig. .2. The PVC pipe is put in the well where its lower end is tied with wooden floats loaded with stones to keep it in position. There is a pulley with a handle (Fig. .3) over which the circular rope passes. (The knots on the rope are flattened by a wooden hammer to make it move smoothly over the pulley.

Process: As the pulley is rotated by the handle the rope comes up the pipe, drawing the air out, and water comes up to fill its place (Fig. .4). The knots act like pistons and keep on pulling the water up and out of the well at the rate of 20 litres per minute.

Approximate Price Range	Rs. 300
Source:	DIAN DESA Jl. Kaliurang KM7, Jurugsari, P.O. Box - 19, Bulaksmur, Yogyakarta, INDONESIA

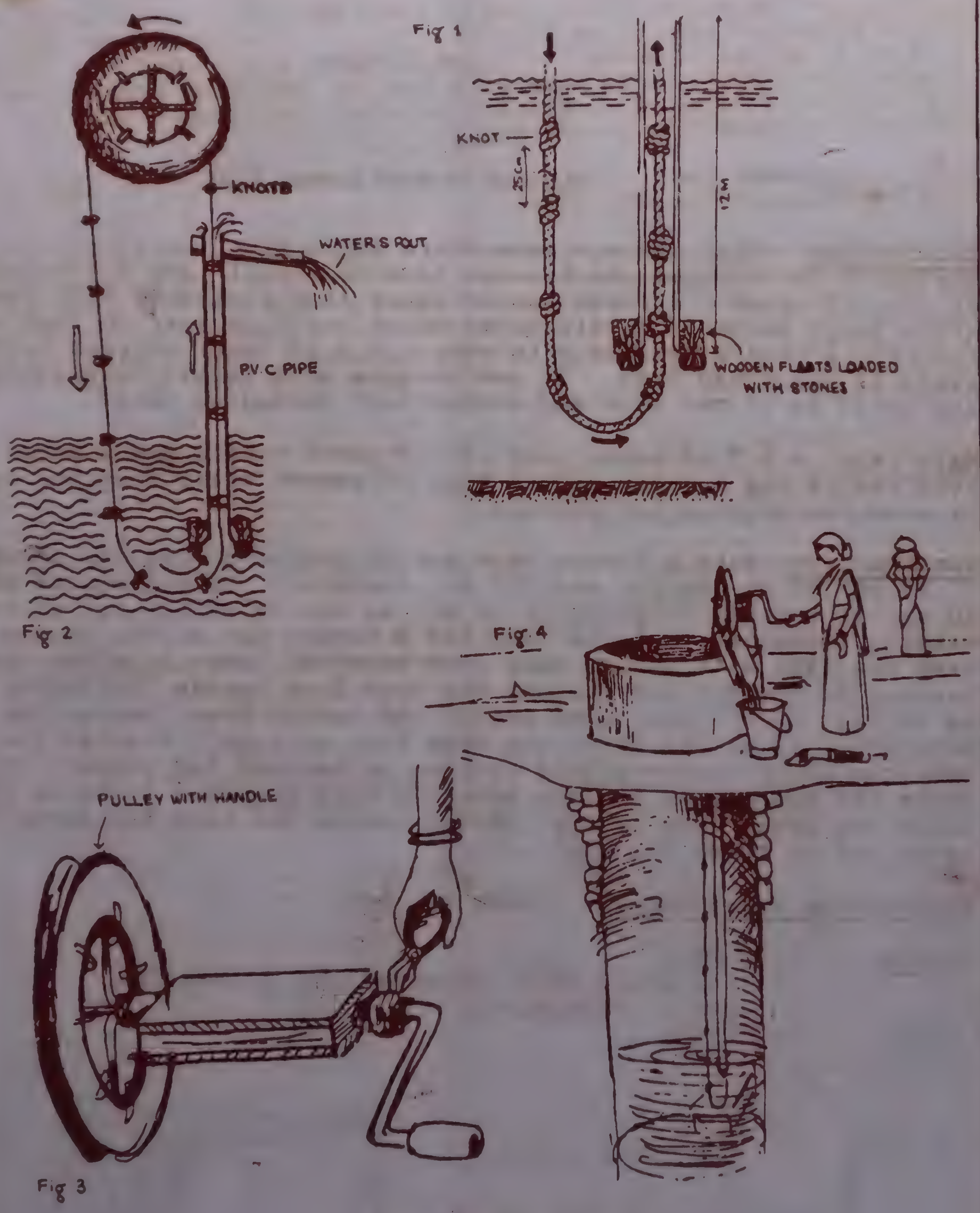


Fig 1
KNOT
25 Cm
12 M
WOODEN FLOATS LOADED WITH STONES
KNOTS
WATER SPOUT
P.V.C PIPE
Fig 2
Fig. 4
PULLEY WITH HANDLE
Fig 3

KNOTTED ROPE PUMP

BAMBOO CEMENT WATER TANK

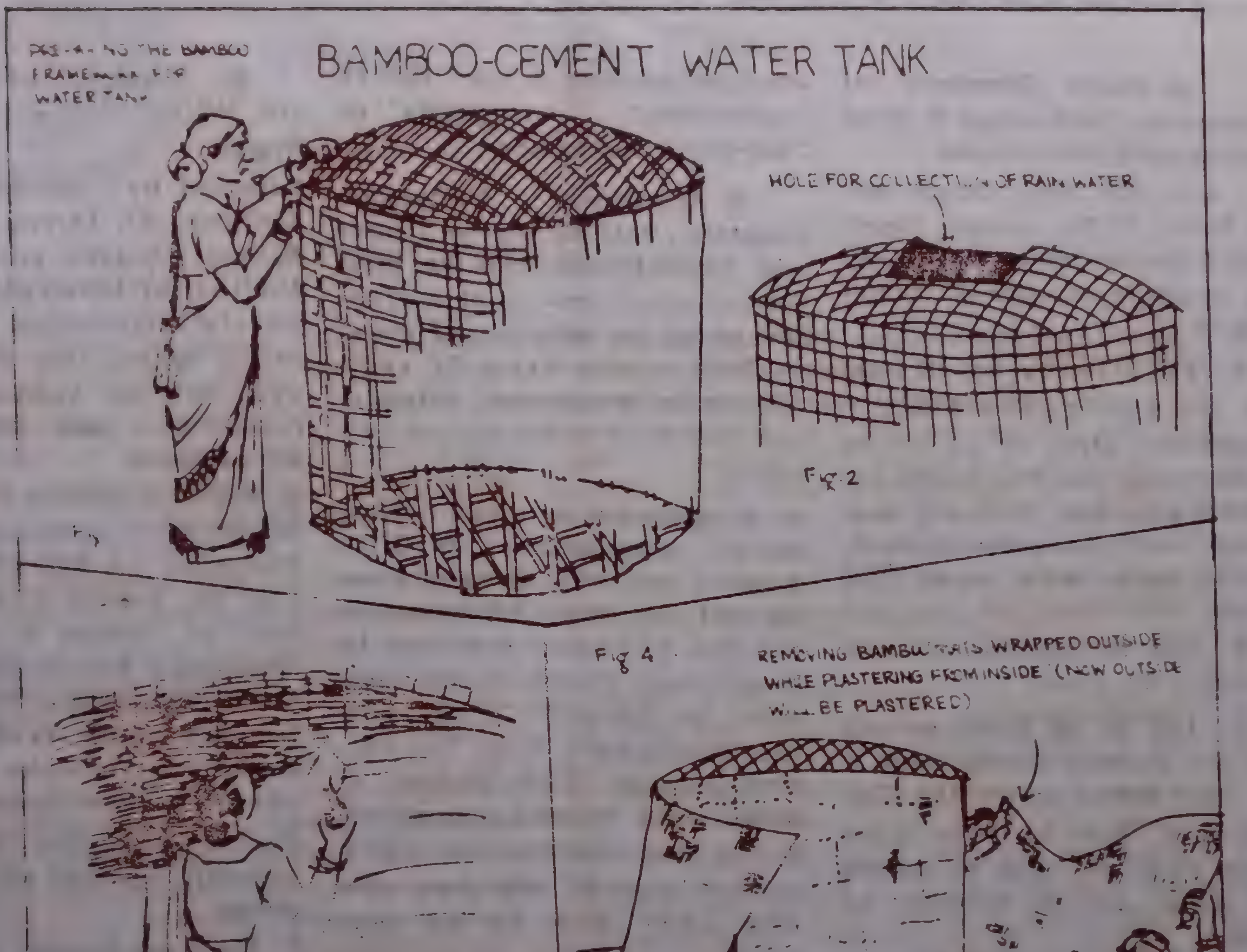
Description: Water storage reservoirs are a great necessity in rural India, specially in villages where women have to travel long distances to get a pitcher of water. A cheap bamboo water tank plastered with cement can store large amounts of rain water which could be used in lean periods. For this a simple technique to make a 4.5 m^3 water storage tank of bamboocrete is described here. It can be made with locally available resources and skill in 12 man days and stores 4500 litres of water.

Materials: A 4.5 m^3 water tank of 1.5 metre height and 2 meter diameter requires 18 big bamboos and 10 bags of cement apart from the tools generally used for contruction purposes.

Construction: Make a bamboo drum out of bamboo strips (as shown in Fig. 12.1) of 150 cm. height and 200 cm. diameter. Make a square hole of 50 x 50 cm. at the top (Fig. 12.2) to act as the inlet for collecting the rain water. (Remember that the drum has a bamboo mat at the bottom and the top). Wrap the tank with bamboo mats from outside. Lower a ladder through the manhole at the top and plaster the tank from inside (including the floor) as in Fig. 12.3. Now, come out of the bamboo drum, remove the bamboo mats (Fig. 12.4) and paint the drum from outside. Plaster the top of one drum using wooden planks resting on bamboos for support (Fig. 12.5) Shape the manhole at the top properly with a wooden frame or mould and allow the water tank to dry. After curing the tank for seven days with water, it is ready for use.

Approximate Price Range: About Rs. 500.

Source: DIAN DESA
Jl. Kaliurang KM 7, Jurugsari, P.O. Box 19,
Bulaksmur, Yogyakarta,
INDONESIA.


BAMBOO-CEMENT WATER TANK

PREPARING THE BAMBOO FRAMEWORK FOR WATER TANK
Fig
HOLE FOR COLLECTION OF RAIN WATER
Fig 2
PLASTERING THE BAMBOO TANK FROM INSIDE
Fig 4
REMOVING BAMBOO MATS WRAPPED OUTSIDE WHILE PLASTERING FROM INSIDE (NOW OUTSIDE WILL BE PLASTERED)
PLASTERING THE TOP RESTING ON WOOD PLANKS SUPPORTED BY BAMBOOS
BAMBOO SUPPORTS
Fig 6

ROOF WATER COLLECTION IN BAMBOO CEMENT TANK

BOOK WATCHING

■ **World Directory of Appropriate Technology & Rural Development Institutions:**

Available from Global village Crafts, 17 St. James Street, South Pethertos Somerset, England. It is a systematic detailed compilation of –

1. List of Institutions all areas over the world working in rural in Development areas of Agriculture and equipment, communication, co-operatives, energy, food and crop storage, health care and equipment, housing, tools, water supply -576 sheets.

2. List of international organisation - 62 sheets.

3. List of 68 books, periodicals and journals related to A. T. and Rural Development. The Directory is in form of loose index sheets which are easy to classify and store and is available on request.

■ Appropriate Technology Institutions: a Directory:

Compiled by the Appropriate Technology Institutions Units, 9 King Street. Coverd Gardens, London, WC2 8HN UK. 1983,P. 35. The names and addresses of organisations actively involved in the promotion, development and application of appropriate technologies around the world are listed in this directory.

■ Appropriate Technology Directory : vol. 1 by Nicolas Jequier and Geperd Balance, published by Development Centre of the Organisation for economic Co-operation and Development, 2 rue Andre-Pascal, 75775 Paris, Cedex 16, France. 1979, P. 361 It is a list 277 organisations. in 79 from of countries working in the field of 'appropriate', 'intermediate' or 'low-cost' technology.

■ Appropriate Technology Directory ; Vol.II by Nicolas Jequier and Gerard Blance. It is the most comprehensive source of information about the activities of close to 316 organisations in 90 countries, on the development, diffusion and promotion of appropriate technology.

■ Directory of non-governmental organisations: In OECD member countries, active in development cooperation Vol. I: profiles and Vol. II: index, published by Development Centre of this Orga. sation for Economic Co-operation and development, Paris. This directory provides 1700 profiles of development oriented non-governmental organisations in OECD member countries and show who does what work for the third world.

Environment:

■ Directory of Non-Governmental Organisation in Environment:

Compiled by:- Environment Information System (ENVIS)
Department of Environment
Govt. of India, New Delhi. 1984
p. p. 213

This Directory contains non-governmental organisations of India, Actively engaged in the field of environmental protection, their objectives, activities, publications etc. Directory is arranged in alphabetical order of name of organisation, followed by Statewise index, Location index and Distribution of NGOs in INC Contry.

■ Directory of Environmental NGOs in the Asia Pacific Region:

Compiled by: Sahabat Alam, Malaysia, 37, Lorong Birch, Penang, Malaysia. pp. 257
Multi-sector listing of Non-Governmental Organisation in the Asia-pacific region. This directory provides data on address, activities, publications, area concern and achievements.

■ WOMAN : Science & Technology for Women (a Compendium of Technologies) pp. 193, 1982 available from Dr. Kamala Kumar, Department of Science & Technology, Technology Bhavan, New Mehrauli Road, New Delhi - 110 016. The first half of the book deals with simple technologies for rural women and the second half is divided into three sections - 1. voluntary Agencies working for women.

2. Name and address of the Chairman of State Social Welfare Advisory Boards, 3. Addresses of Organisations involved in Rural Development and Appropriate Technology and 4. Women's Welfare Organisations in India. The Directory is available on request.

■ Cataloge of agencies reaching poorest women in India: Devki Jain, Institute of Socal Studies, M-1, Kanchenjunga, 18-Barakhambe Road, New Delhi-110 001 PP. 113, April 1988 (Price not indicated).

Where We Err

It is astonishing how badly development professionals have been wrong. Many deeply held beliefs for which evidence was mustered in their days have now been largely rejected. e. g. agricultural practices-beliefs that the capital-intensive mechanised monocroping of small farmers was uneconomic and inefficient; that on-farm post-harvest losses of total food production, not one of entitlement or effective demand as now understood; that malnutrition was more a problem of protein deficiency than lack of calories; that human calorie requirements were higher than is now believed. There was also the behavioural biases of rural development personnel - the brief and hurried rural visit by the urban based professional.

Resource-rich farmers usually have fertile soils, controlled irrigation, tractors or strong draught animals, and good access to credit and agricultural inputs like improved seeds fertilizer and pesticides. They face relatively low risks, and produce for the market.

Resource-poor farmers have poor soils, either no irrigation or irrigation they cannot rely on, no draught animals, or only weak ones they have to hire, and poor access to credit and agricultutal inputs. They face high risks and give priority to assuring their subsistance food supply. For them the the high input technologies do not fit - and they may even be positively dangerous.

The inappropriateness of the first technologies (mechanical cultivation, exotic cattle, purchased inputs including chemical fertilizer and pesticides, etc.) for resource-poor farmers has been increasingly recognised. New approaches to agricultural research have been evolved which reverse the sequence of research and start with farmers and farm households and their needs. An attempt is then made to identify or evolve technologies which will satisfy those needs.

These approaches put the farm family first and have been described as the farmer-first-and-last model, which involves four reversals from first to last; in explaination, learning, location and evaluation. (Robert Chembers in 'International Agri. Development' May-June 85)

(*Contd from page no. 13,* CART on the Move

NATURE, Trivandrum (Kerala)	Catalysing tribal development by the application of SET through training demonstration and research.
Gandhigram Institute of Rural Health & Family Welfare Trust, (Madurai) Tamilnadu	An action research programme to improve the storing and cooking methods in rural areas.
Bhagavantula Charitable Trust, Zellamanchili, Andhra Pradesh.	Integrated Prawn and salt production
Government Polytechnic, Xorbandar, Gujarat.	Pedal Power Pump.
Murugappa Polytechnic, S. M. Nagar, Madras.	Technology tools for villages and training for village youth.
Mehrauli Khan Mazdoor Sahkari Samiti Ltd., Mandi Pahari, New Delhi.	Housing for stone-quarry at Mandi, Mehrauli.

* *

Food & Nutrition

CAROTENE IN VEGETABLES AND FRUITS

Any young child who consumes between 25 and 50 grams per day of high-carotene foods from the following list should be able to avoide nutritional blindness. When feeding children, fruits usually are more welcome than vegetables; therefore, maximum use should be made of papaya and Indian mulberries, when they are in season.

Vegetable	Carotene Content mg/100 grams edible portion
1. Agathi	5
2. Amaranthus	4 to 7
3. Turnip greens	9
4. Bathua	6
5. Knol Khol	7
6. Beet greens	6
7. Carrot leaves	8
8. Drumstick leaves	9
9. Indian Mulberry fruit	36
10. Papaya fruit	12

IRON FROM COOKING UTENSILS

Some new research indicates that cooking in iron skillets and pots can add significant amount of iron to the food a potentially important finding, given the fact that iron deficiency anemia is the most wide-spread nutritional deficiency in the world. Dr. Helen Brittin, Professor of Food and Nutrition at Texas Tech. University does not yet know precisely how much iron is transferred to specific foods when they are cooked in iron utensils, but she hopes to find out.

She tested 20 foods and found that, on the average, they contained twice as much iron when cooked in iron skillets as those prepared in utensils made of other materials.

But, she also discovered that not all foods increase in iron by the same amount. The iron uptake appears to be enhanced when the foods have a high acid content, a high moisture content, and are cooked for extended periods of time.

THE WINGED BEAN

Every part of the winged bean plant except for the stem — leaves, immature pods, seeds, shoots, blossoms, and tubers — is edible. The seeds, which constitute the most nutrious part of plant, are rich in vitamine E, iron and polysnsaturated oils, and can be steamed, boiled, fried, roasted, fermented or made into milk, tofu (bean curd), or tempeh. The seeds oil can be extracted in the same way as soybean oil, and leaves behind a protein-rich meal that is ideal as a weaning food. The tuber is aspecially high in protein (9 to 15 percent) and also might make a good weaning food. The plant's green leaves contain a high level of vitamin A as well as tryptophan (an essential amino acid), and some important minerals.

COWPEA AND BEAN LEAVES ARE WORTH EATING

International horticulturist H. C. Bittenbender urges increased consumption of cowpeas and bean leaves. The leaves of these legumes are highly nutritious — even more so than their seeds. When compared on a cooked weight basis with their seeds, cowpea and bean leaves contain more calcium phosphorus, iron, niacin, vitamin C, and beta carotene (precursor of vitamin A), and they contain 70 percent as much protein. They can be grilled, or added to strachy staples, soups and stews.

They can be dried for future use with far fewer pest problems during storage than the seeds. Moreover, even when dried, both kinds of leaves retain greater amounts of vitamins than most other locally popular dried leafy vegetables.

Thus cowpea and bean leaves are an ideal food for the preharvest hungry season, roughly 60 percent of their mature leaves can be harvested without compromising the seed yield.

(Dr. H. C. Bittenbender, Department of Horticulture, Horticulture Building, Michigan State University, East Lansing MI, 48824-1112, USA).

WINDOW TO THE WORLD

Mosquito-killing-bacteria : Dr. Joel Margalit, a biologist at the University of the Negev, Israel. has discovered a certain type of bacteria which kills mosquito and blackfly larvae. This unique species, found nowhere else in the world, kills the mosquito by paralysing its digestive tract. Sprinkle a bit of the bacteria in a mosquito larvae-infested puddle and the larvae are dead within 30 minutes. The world Health Organisation, which endorses and help fund Margalit research considers the technique "remarkably safe".Tests indicate that these rare bacteria attack mosquito and blackfly larvae- and nothing else. (Iserael News)

Wet Solar Cell : An Osaka University group in Japan has developed basic technology for a "wet solar cell" using a semiconductor materials immersed in liquid to convert solar energy into electrictiy. Having an efficiency rivalling current silicon photovoltaic cells, the technique opens the way to inexpensive power generation. The group adopted a principle whereby a semiconductor when submerged in water or other liquid will polarise into plus and minus charge sides upon irradiation with light. (The Hindu)

Solar Boat's Feat : A Japanese yachtsman Kenichi Horie (46) has become the first man to cross the pacific in a solar-powered boat, covering 6,300 km. from Honolulu to Chichijima island in the Bonins in 75 days. The boat, made of reinforced plastic is 9 metres long and 2.5 metres wide. Its deck is fitted with 42 Solar battery panels, each 90 cm long and 30 cm wide. Solar energy absorbed by these panels is converted into electric power to turn the screw. Maximum output is 1,100 watts and the boat's average travelling speed is three knots. (The Hindu)

Cheap Grain Disinfecting Method : If the grain is heated to 65 degree centigrades or more, all developmental stages of insect pests (eggs, larvae, pupae and any adults that may be inside the grain kernels) are killed. This discovery by some Australian scientists has resulted in the evolution of a cheap and effective method of ridding stored grain of infestation through high temperature treatment. This technology comprises a continuous flow fluidized bed plant, capable of treating up to 150 tonnes per hour of wheat. The plant is simple and safe to operate. It has automatic heating controls and there is no possibility of the system overheating the grain.

Based on current costs of natural gas and electricity; the estimated energy cost of disinfesting one tonne of wheat could be as low as cents. This is lower than the material costs of presently used contact pesticides. (Agricultural News Letter, Austra-Lian Information Services)

FRIENDLY INSECTS

More than 1.5 million species of insects exit on our planet of which most play important roles in ecosystems. About 20 percent are directly useful to man, while only 2 percent are directly harmful to us.

However, due to man's activity, many species are extinct. Others are very rare and may become extinct within the next decade or so.

To halt or, at least, slow down the process' entomologists in the Soviet Union are now preparing a Red Book of invertebrates and are also setting up insects reserves, amid trees and shrubbery on sites unfit for agricultural development. Being protected and enhanced are pollinating and entomophagous insects (the latter are capable of bringing down the population of harmful species). Reserves are also used for trying out various entomological experiments in plant protection techniques (Nag. Times 30-6-85)

points to ponder

Child Labour Forms A Major Chunk

Nearly one seventh of the country's population constitute child labour, working due to economic compulsion Disputing official figures which put the number of working children at 17.36 million, there were 100 million of them in the country- an estimate.

Attributing the perpetuation of child labour to grinding poverty, the organisation said employers also found it economically advantageous as children constituted a cheap, productive, obedient and efficient labour force".

India Has Highest Accident Rate

India, which has the highest accident rate of 34.6 per 1000 also accounts for nearly Six per cent of the total road accidents in the world, though it has only one per cent of the total road accidents in the world and it has only one per cent of the total vehicles, says a study.

According to the study conducted by the Association for Trauma care of India (ATCI) here the accident rate is only 14 in U. S. A. 13.7 in West Germany and 4.8 in Sweden.

The president of the ATCI, Dr. C. Goyal said that in India the fatality rate due to accidents is 57 per cent per 10,000 vehicles while it was only five to seven per cent in Western countries.

(The Times of India, 9 July 1985)

Street Children : Whether runaways, school drop-out or abandoned children for whom the street is home can be numbered by the ten of millions. Their number seems to rise as countries become more and more urbanised, and big cities like Calcutta, Nairobi, Marseiles, New York and Bogota are monuments to their plight, according to a United Nations report just released. In groups of three, five or ten, they often form closely-knit families, feeling closer to street siblings than to their own brothers and sisters in their former homes. Youngesters of up to 18 years living a street life could by roughly estimated at 90 million to another 10 million in industrial countries, according to the UNiCEF. The report included children working on the streets but who still had family ties and those who were living entirely cut off from home. (Nagpur Times)

Calcutta Is Sinking : Metropolitan Calcutta is sinking and surface buildings may be affected unless there is a check on the amount of groundwater extracted for municipal water supply, warns a study by Dr. A. B. Biswas and Dr. A. K. Saha geologists of the Presidency College Culcutta. They say that the city has sunk by about one foot in the last 25 years.

About 200 heavy duty tubewells were supplementing city water supply in addition to the innumerable smaller tubewells sunk by various housing agencies, commercial and industrial establishments and private individuals.

As a result the geological strata was getting compact, they said. The compaction had not yet reached a critical stage but if the decline of artesian pressure was not arrested, land subsidence of greater magnitude affecting surface buildings might occure. (The Hindu)

गरीब की झोपडी और राष्ट्र की आधुनिक
विज्ञान-प्रयोग शालाओं के बीच सेतु का
काम करनेवाली हिन्दी की पहली पत्रिका–

ग्रामोपयोगी विज्ञान

वार्षिक शुल्क : ५ रुपये (व्यक्तिगत) १० रुपये (संस्थागत)
पता : ग्रामोपयोगी विज्ञान केन्द्र, मगन संग्रहालय, वर्धा ४४२००१ (महाराष्ट्र)

PADDY HUSK HAZARD

Rice is a vital crop to the people of Malaysia. Besides being essential to their economy, it is also a dietary staple. Rice production in the country grew from 1.4 million tonnes in 1970 to just below 2 million tonnes in 1980. Rice milling forms an integral part of rice production contributing significantly to employment. There are an estimated half a million rice farmers and about 15,000 mill workers involved in the rice industry.

However Malaysian rice workers and communities near huge rice mills are continually exposed to the hazards of rice husk, Pollution is caused by rice dust which is released during the process of drying and milling the rice, it is composed of rice, husk and dirt particles.

Rice workers use handkerchief and towel as protection against these hazards;, but Dr. Lim Heng Haul of Malaya University, says that this is inadequate protection because the particles are very tiny and can easily pass through cloth.

In collaboration with University Pertanian Malaysia and Factories and Machinery Department, Dr. Lim has studied the health conditions of 122 male workers from three Malaysian rice mills.

The study has found a high incidence of irritating cough among rice mill workers. Over 62 percent of them had eye irritations and pruritis (itchy skin), half suffered from nasal catarrh (sneezing and running nose), one-third had rashes, and 27 percent suffered from tightness of the chest opacities (streaky white patches) in the lower zones of their lungs.

Scientists believe the formation of fibrous tissues in the lung of some workers may be a form of silicosis common among quarry workers and potters, or a condition known as extrinsic allergic alveolitis,''

Rice husk is suspected as a cause because it has a high sllica content. Because of its abrasive action, burnt rice husk has been used in detergents, and as a cleanser for turbo jet engines.

(Sahabat Alam, Malaysia)

Role Of Carbondioxide

A joint UNEP-WHO-ICSU Conference was convened in Villach (Austria) from 9 to 15 October 1985, with scientists from twentynine developed and developing countries, to assess the role of increased carbon-dioxide and other radio active constituents of the atmosphere (collectively known as greenhouse gases and aerosols) on climate changes and associated impacts,

Other greenhouse gases reinforce and accelerate the impact due to CO_2 alone. As a result of the increasing concentrations of greenhouse gases, it is now believed that in the frist half of the next century, a rise of global mean temperature could occur which is greater than any time in history.

While other factors such as acrosol concentrations changes in solar energy input, and changes in vegetation may also influence climate the greenhouse gases are likely to be the most important cause of climate change over the next century,

* *

(cont. on page no· 1)

dawn of 21st century is not the last century's dawn for human civilization and that if for centuries to come this planet of ours is to continue to prosper, tensions and frictions must be removed in all walks of life. The greater is the speed of a machinery, the more efficient should be its lubrication system so also it is with human civilization. The need for love, compassion and having more pleasure in giving than getting are the human properties which act as lubricants to overcome the frictions generated by the speed of life created through technological advancement. If these spiritual human values do not go hand in hand with scientific achievements, heating of the world we live in will burn us up. Thus Gandhi gave a timely call to bring science and spirituality together.

If we want this Gandhi idea to find fruition, science and technology should not go on increasing by giving more powers to humans destroying the non-renewable resources, polluting the environment, irreversibly disturbing the fine ecological balances and annihilating all life on the planet. It should on the other hand lead humans towards amity amongst themselves and symbiosis with the Nature.

Some day science is neutral and cannot be blamed for the ills wrought by its users but the fact remains that technology is not only guided by the values of consumerism and competition commercial interests promote but it also promotes these baser instincts. In its place if objective truth arrived at scientifically is to be adhered to, the scientists will have to deny to cooperate in misuse of knowledge for greed and power of the few, or many of this generation at the cost of the interests of generations that are to come. Similarly it has to be objective enough not to work for such of human species which are in conflict with those of other life systems of the planet. The scientists and technologists instead of being guided by the economic or political powers that govern them and which they strengthen through their work, should strive to free themselves from this state of affairs and seek to influence the prevailing policies of short range and narrow interests towards a more saner, humane and long range world view. Our dedication to this constructive endeavour will bring us nearer to Gandhi's concepts, precepts and practices.

It is heartening to note that
as the 21st Century is
near the values that
started on are gaining grou
is natural too, for human
ence will not allow this
wither due to its folly.

Devendra Kumar

* *

WDA - 119

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BOOK - POST.
PRINTED MATTER

23. EDITOR
CFTRI NEWS LETTER
CENTRAL FOOD TECHNOLOGICAL
RESEARCH INSTITUTE
MYSORE - 570013
KARNATAKA

Published by : Devendra Kumar of behalf of Science for Villages, Wardha, : Devendra Kumar
Managing Editor : Vibha Kumar
Editorial Office : Centre of Science for Villages, Magan Sangrahalaya, Wardha 442001.
Printed at : Samyayog Mudranalaya, Wardha 442001.

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o.99-100, Dec.-Jan. 1986, Monthly, Annual Subscription : Rs. 15/-(10 Dollars) Individual & Rs.25/-(15 Dollars) Inst

ECONOMIC POLICIES AND THE COMMON MAN

Common man is one who is in least command over his circumstances. Democracy is an exercise which tries to give the control of his environments to the common man. In political paralance the decision making process in democracy works to involve the affected parties, participants in the decisions that affect them. In economic field the forces of economic power that mould the common man's destiny also need to be judged from this very criteria.

The governmental policies of free India have been basically made by people educated in Western Liberal economic thoughts and they have tried to apply, the principles found successful in the rich countries of the West, in Indian conditions and have shown great innovative genius to adapt them to very different conditions here. The country having been sucked dry under imperial rule for three hundred years of commerce which as per Tagore's last speech of his life was compared to a reservoir where the water evaporated in India and the clouds burst in Europe. The industrialization andurbanisation that was generated in the country in colonial days was also meant to assist in the process of exploitation. In 1946 when Nehruji took over the charge things were at the lowest ebb and now four decades of economic planning by Indian leaders have shown certain results. We have to judge these to discern how far economic democracy parallel to political democracy has made the common man a master of his destiny. We have been having a policy that has been helping in urbanization, industrialization, technologization and to enable us to live as people do in the western countries.

Whereas in time the four decades of free India's planning is one continuam in space we are past of the whole third world-or two third of the world population which was under colonial control before the 2nd World War and which is trying to seek its feet in the turbulent economic current, in recent years. These under-developed or developing countries are all following the path shown by the 'developed' ones. Gandhi did show a different way which was applicable for the whole world but India did not find itself strong enough to pioneer treading this path. Take any country on the map and you will find that the economic policies regarding increasing productivity are not much different from our own.

These policies have been to increase agricultural and industrial production at a fast rate so that India could not only be self reliant but also be an exporting country gaining a trade balance which is favourable. This kind of economic order requires capital investment of a high order which the West could generate by the wealth plundered from the areas colonised. Here we have to generate it unfortunately by keeping the poor still poor. Not that we want them to remain so but if investible capital is to be generated it is the richer 10% people who have 50% of the personal income of the country, who can contribute to the savings more than the rest of the people. They add to the fixed of capital formation. The equalitarian dream of Gandhi and Nehru are therefore not insisted upon if the industries are to develop on sophisticated lines and be competitive in world markets. This aim also goads the natural planners to seek for loans

(Contd. on page 28)

FROM THE LABS

New Rural Industries

New Method to Filter Water : by treated clay

Dr. K. Srinivasan, University of Michgan USA.

In the process developed by Dr. Srinivasan, clay is treated with aluminium hydroxide which is not a costly material, along with a few other chemicals. The clay mass, as a result, gets endowed with tiny pores. While the size of there pores is large enough to allow water molecules to pass, it is small enough to trap harmful chemicals which exist in impure water.

Experiments have shown that the clay material so treated is much more efficient in arresting harmful chemicals than activated carbon which has so far been considered the best filter material for water. For example while the new material is found to separate 3 mg. of harmful chemicals 10 and in 20 million gallons, other known materials do not have even a small percentage of this much efficiency. The new material is capable of trapping even a single molecule of a harmful chemical present in several million of molecules of water and thus assures supply of pure water for drinking purposes. The cost of the material is far below that of activated carbon. The running cost is negligible since the same filter ban be used again and again after a simple treatment.

(Source : THE STATESMAN, Date : 22–7–1985)

Power From Pumped Water

In India there were 5,177,477 electric pumpsets in operation as on 31-1-'84 besides lakhs of diesel pumpsets. The water from the delivery pipe has considerable force.

A novel method to extract 'Power from Pumped Water' has been designed by Mr. A. Jagadeesh, Convener, Society of Science for the People, Nellore (A. P.), India.

Consists of a wheel of 2 ft. diameter with buckets (Iron). The shaft of the turbine (Water Wheel) is mounted on a stand with 2 ball bearings. At the other end of the shaft a pulley 10" in diameter made of Alluminium) is attached. A. D. C. generator is mounted on the stand with a small pulley (2") in diameter. A V belt connects the two pulleys via a dummy pulley. The dummy pulley is introduced to reduce the load on the shaft of the generator. The water from the delivery pipe falls on the water wheel which rotates the generator through the pulleys. The generator in the picture gives an output of 150 watts D. C. at 400 RPM. The power produced can be stored in batteries or directly utilised when the water is pumped. If one wants A. C. one can get it through conversion of D. C. produced.

With proper matching, from the delivery pump of a 10 H. P. motor, one may generate 2 K. W. electricity. In wet fields (Where a farmer grows 3 crops a year like Rice) the pumpset will be in operation for most of the time in a year. As such the power generated can be utilised for a variety of purposes.

The device described above can be fabricated at local level even by a skilled labourer and costs just Rs. 2,000/–

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MYTH OF 'DEVELOPMENT'

Gustavo Esteva

(The author shows that Mexico's experience in development, like that of all poor nations teaches that current approach needs chang. – Editor)

For the last decade I have collaborated with several hundred "de-professionalized intellectuals" at the service of a network of 400 grassroot organizations in slums, villages and the boondocks. For these world's development has always been seen as a threat.

Most peasants are aware that development has undermined their subsistence on centuries – old diversified crops. Slum dwellers know that it has made their skills redundant and their education inadequate. If they do succeed in installing community life in the hand-made shanties or abandoned buildings, bulldozers and policy — both at the service of development –will relocate them. Truly marginal groups know, how it feels to be pushed, inch by inch, into the cash economy.

On the other pan of the education scale, sit an increasing number of ex-economists and onetime sociologists or industrial managers, working at the grassroot level, who have had great difficulties in making their former peers feel the weight of what they have learned : no indicator can register the pain caused by the loss of self - reliance, dignity and solidarity the unmeasurable shadow of a quantifiable progress.

Quetioning the Developing Decade.

We have always classed the term "development" alongside other fuzzy slogans, like revolution and structural change. Recently however, a few of us have been tempted to present what we ourselves do as development. For within the last few years a net working establishment has come into being that travels around the world waving the banner of "Alternative Development." "Popular Participation," "Self-Help," "Holism," "Networking," "Decentralization," "Local Control," "Low Energy Tools" are its slogans. I am confronted by those who, at home as well as abroad, wish to mask the stench of "development" by using "Alternative Development" as a deoderant.

For a full generation development has been sacred and inviolate. It has been the common idol of sects, pursuing the same goal, albeit by incompatable means. The time has come to recognize development itself as the malignant myth whose pursuit threatens those among whom I live in Mexico. We ought to oppose the lease on life that a new "alternative" establishment promises. We cannot ask US bureaucrats, or the new crusaders for alternatives, who derive their own dignity and incomes from the promotion of development, to take the lead. We must have the courage ourselves to demonstrate that the "three development decades" were a huge, irresponsible experiment that, in the experience of a world–majority, failed miserably.

In Mexico, the Rural Development Bank no longer contains sufficient funds to force peasants to plant sorghum for animal feed. As a result in many places, the return to traditional intercropping of corn and beans has not only improved the diet but has restored some village solidarity – thus allowing available cash to reach farther.

Away from Market Economy.

Production cooperatives are springing up and thriving in the very heart of Mexico City, thanks to the decreasing purchasing power of those formerly employed. Shops now exist in the slums that reconstruct electrical appliances. I have observed more than once how slum producers Put their own name and address on a product because it inspires greater trust in the client. Neighbourhoods have come back to life, along with a phenomenal increase in next–door catering. In the midst of inflation, devaluation, so–called unemployment and a decline in the economicaly-defined national product, the majority of the people among whom, I dwell are much better of than they have been for years.

One of the contributing factors to this sense of well–being is a closing gap between those who were formerly hurt by development rates and those who were favoured for a while by its growth.

Even among the intellectuals, a growing number have welcomed the demise of the development myth and helped disintoxicate official policy–making: so long as development is pursued, we will never be able to deal reasonably with our debt.

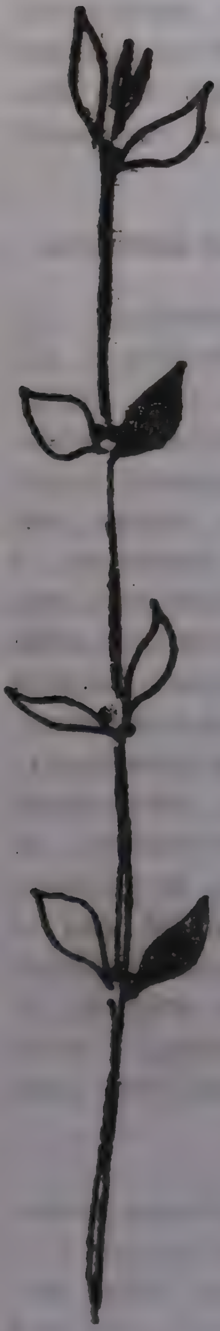
Modernization of Poverty ?

As the definitions of development became more varied and contradictory, its connotations become stronger. Development means to have started on a road that others know better, to be on the way towards a goal that others have reached, to race up a one-way street. Development means the sacrifice of environment; solidarities, traditional interpretations and customs to ever–changing expert advice. Development promises enrichment; and for the over whelming majority, has always meant the progressive modernization of their poverty : growing dependence on guidance and management.

Mexico's predicament, which others call crisis, we hearld as a chance. It is our chance to slip to others, who are now forever out of a job, the ten thousand tricks by which we have used and abused modern techniques. It is our chance to delink well–being from development. I would like others, who are not as lucky as Mexicans, to be able to follow our reasoning.

⊛

FROM THE PLANTS



A PROTEINACEOUS LEAFY VECETABLE

TRIANTHEMA PROSTULACASTRUM (Aizoaceae) is a prostrate plant (30-45cm) of the cultivated fields, in waste and dry places as a weed. It is popularly known as "Valukku Keerai" or "Paruppu Keerai" in Tamil. Flowers of this plant are solitary, sessile, sheathed by the base of the petiole. It withstands even drought situations. Pest and diseases are not serious threats to its cultivation.

The protein content of Trianthema is 49 per cent, which is comparable to that of soyabean and more than that of other legume seeds. The young leaves and shoots are sliced and cooked much like other leafy vegetable. It has higher nutritive value than amaranthus. Seeds have to be collected by uprooting the entire plant when they are 80–90 days old. The mature plants are heaped, dried and threshed.

(SOURCE : THE HINDU Date 29-5-1985.)

Insulin-like Drug from Bitter Gourd.

An insulin–like drug extracted from bitter gourd, a common tropical vegetable, may open a new horizon in the treatment of diabetie, say a group of researchers at the University of Rajasthan, Jaipur. Named "polypeptidep," the drug is calimed to be as potent as insulin on the basis of trials carried out in animal and human diabetic patients.

Dr. Pushpa Khanna and her colleagues at the university laboratory of plant physiology and biochemistry who isolated the drug believe that someday bitter gourd may replace animals as the source of anti–diabetic drugs.

Insulin, at present the only remedy against diabeties melitus, is obtained mostly from pancreas of pigs, some 10,000 pound of insulin. But the sources of 'polypeptide–P' is a plant says Dr. Khanna. It is not necessary to grow the plants in fields because Dr. Khanna extracts the drug from cells of bitter gourd cultured in test tubes. Dr. Khanna, who has been engaged in research for several years, first reported extraction of the anti-diabetic drug in 1974.

Now the State Financial Corporation plans to set up pilot plant in Jaipur to produce the drug using Dr. Khanna's techniques.
(Source : NEWSTIME
Date :– 9-5-1985)

Kashmir's Tree of Utility.

A locally fostered tree called 'fras' offers promising prospects for providing firewood, vital for homes and cooking, in the Kashmir valley Several Populus species belonging to the Salicae family popularly known as poplar are found in Kashmir, where environmental conditions are most favourable for their growth.

Tall, pyramid–shaped, marked by simple alternate leaves and bitter bark, these trees con perhaps pushes aside the hitherto highly–rated coniferous trees in terms of financial gain. Fras grows quite rapidly about three metres in an year and could be generated easily. By copping, at least three harvests are possible from one tree. It grows in ravines, marshy habitats, along mountain streams, avenues and as hedoes around homes.

Fras, wood has a great demand in the match industry, for making pulp, leaves are used as forage for cattle and as timber and as plywood. Despite such a tremendous potential, it is not widely propagated. Paradoxically enough, the credit at the moment for having more fras in Kashmir should go to the farming community who have nourished them in beautiful, systematic rows on bunds of cultivated fields, on banks of streams, on pathways, around orchards and in wastelands in rural areas. Plantation of this species could help check frequent landslides in the Kashmir valley.

By planting fras trees in one hectare of land, the economic gain could well exceed Rs. 50,000. On this count, if at least 5,000 hectares of Kashmir's 'idle land' is used for fras cultivation, a decade hence people of Kashmir can earn well over Rs. 250 million. The suggested 'idle land' area for poplars is roughly one-fourth of Kashmir's fruit–bearing orchard area. (SOURCE : PTI, SCIENCE SERVICE (NEW DELHI) Vol. 4, No. 1–55 May 1985.

Cashew fruit can kill Mosquitoes.

If you have too many mosquitoes and cashew fruits in your area, use the latter to get rid of the former. According to Isal Kubo, an associate professor of natural products chemistry at the University of California–USA, cashew fruit extract can kill larvae of mosquitoes and aquatic snails.

Delivering a lecture at the International Conference on Prosaglandins in Japan, Kubo said that anacardic acid which can be extracted from fruit of cashew trees could be used as an alternative to chemical pesticides to fight two deadly parasitic diseases, namely malaria and schistosomiasis

Kubo discovered the pesticidal nature of cashew fruit when he noticed African natives dumping large quantities of the fruit into ponds where mosquitoes and aquatic snails breed. His research revealed that anacardic acid is the substance responsible. However its mode of action has not yet been found out.

C.F.T.R.I., MYSORE

Use of Besharam as Building Material.

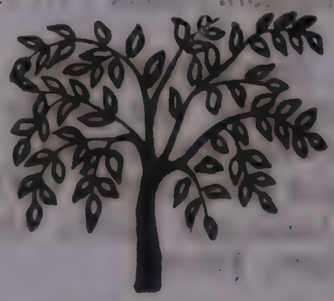
BESHARAM (Ipomoea carnea) has been identified as a useful material for low cost housing, according to a study conducted at the Regional Research Laboratory, Bhopal.

The study says Besharam is a ligno–cellulosic plant material having 57.7% cellulose, 16.59% lignin and 17.3% pentosan.

Its tensile strength is 15–25 MPa. Besharam chips and its powder mixes readily with cement mud. The bond strengthe of the plant material with mud plaster and 2.5% cement was 0.7 kg. cm.2 The ultimate load bearing capacity of 1.5% cement stabilized mud plastered panel having 14 vol.% Ipomoea was 300 kg/m. giving a factor of safety of 3 for wind loading was 100 kg./m;2 the study concluded.

Besharam is a wild growing plant in Madhya Pradesh and many other parts of India. Its powder has been used as a filler in polyester to make light weight particle boards.

PTI SCIENCE SERVICE (NEW DELHI) 1 – 15 Jun 1985.



ABOUT US

THE FIRST PHASE

The Centre of Science for Villages (CSV) started functioning in 1976. The first phase was of collection of materials on rural technologies pertaining to the four broad areas of non–farm and non-land based economic activities of the villages viz. : (I) Rural housing & environment (II) Rural energy and fuel (III) Rural tools and implements, and (IV) Rural crafts and industries (Non–traditional as to open up new avenues of employment).

Two years were spent in this phase which included sharpening of focus through meetings and seminars (Jan. 1976 – International seminar on 'Technologies for the Third World poor' at Sewagram, Wardha – attended by 80 participants from abroad and 100 from the various scientific institutions of India). We held discussions, meetings on the subject with various scientific forums including the one at Indian Science Congress at Waltair (in 1976) and Bhubaneshwar (in 1977) with Dr. M. S. Swaminathan and (in 1979) at IIT Delhi Dr. Sethna as chairmen, respectively. This also included the meeting with the Indian National Science Association, New Delhi, under Dr. D. S. Kothari. The advisory committee of CSV held meetings at the IIT, Delhi under Dr. Y. Nayudamma's chairmanship.

We also established close linkages with the laboratories of CSIR, KVIC, Universities, IITs and other institutions of Scientific education and research and generally dessiminated the theme of Science for the Villages with group of young scientists based in Delhi with a core which included Anand Kumar, Narendra Mehrotra (AIIMS), Ajay Kumar (IIT) and Rajendra Prasad (IIT).

Thus documentation, discussions, direction and dessimination was sought to be done in the first phase when the monthly – 'Science For Villages' – emerged in September, 1977 with Nagesh Hegde of the Jawaharlal Nehru University, Delhi, as the Managing Editor.

THE SECOND PHASE

In the Second Phase, from 78–79 till 83 – 84, the five years were devoted to identifying research areas as are critical in village life and fall within the four categories chosen by the CSV for work. With the help of Department of Science and Technology (DST), Govt of India, CSV submitted five research proposals. The proposals were : (I) Rural housing – construction materials (II) Construction techniques (under Vinoo Kaley), (III) Biogas plant techniques (M. A. Sathianathan & Tarak Kate) (IV) Red clay heavy pottery (under the direction of S. K. Mi mira) and (V) Banana fibre paper technology (R. C. Maheshwari & S. B. Khodke).

Apart from the above mentioned research projects, long–duration indepth research projects involving new appropriate techniques which could be converted into trades for the rural areas, were studied.

The team of CSV always consisted of these three kinds of people : (I) Technological (II) Artisanal and (III) Rural Youth. These three worked together in the specified areas with the help of a library and documentation centre, a minimal laboratory and a production structure. They were always in close contact with the district as well as the regional level (Nagpur based institutions like the National Environmental Engineering Research Institute, Nagpur University and the Regional College of Engineering.), were sought assistance from and kept in close touch with. The idea was that such Centres of Science & Technology working out the problems of the villages could be started everywhere by having liaison with the existing technological structure and utilising and energising them to solve the problems of the poor of the area.

CSV established relations with other agencies working in similar fields at the international level. Representatives of CSV participated in international conferences (organic farming conference, Montreal, 78, U. N. Conference on Science & Technology for Development, Vienna,' 79; Socially Appropriate Technology Information System's seminar in Senegal,' 81, and in Bolivia,' 82 etc.) and kept in close touch with GRET [France], ITDG [U. K.], TOOL

[Holland], SKAT [Switzerland], GATE [Germany], ATI [U. S.], VITA [U. S.]; and other appropriate technology bodies. However, CSV did not seek financial support for its projects or other work from any agency outside India as it followed the principle that for fulfilling our country's needs we must as far as possible seek indegenous support. CSV however hinted volunteers from abroad to come and work in India. Marie Farge, a physicist, from France came to work on solar energy and two architechts, Susan & Christian (also French) worked on rural housing. GRET of France made some joint projects for India where three scientists came and studied certain rural problems as are common with the Third World countries and tried to work on Small application of their techniques including organic composting, water harvesting, and rural housing. Guy and Greet Barthelemy of Amite Et Civilization also spent one year at Sevagram and worked on improved tools and equipments for the villages. However, Dr. Ripley Fox, an expert authority on algal production (algoculture) specially Spirulina, who has taken up a global experiment (at three stations around the globe) to produce, under village conditions, this highly nutrtious human food to combat malnutrition among the poor, chose to have one station of this experiment in conjuction with the CSV at village Karla (5 km from Wardha town). For this experiment Dr. Fox's organisation finds the funds and he himself guides it, visits Wardha twice a year.

In the international relationship the exchange of literature is an important avenue. We receive periodicals and literature from about 100 foreign sources and we send them ours in exchange.

Now, we are in the Third Phase (1984 onwards) of Extension and Training added to our earlier programmes. Under extension programmes CSV took up the extension of biogas and smokeless 'chulha' (wood cookstoves) and undertook training of masons for the (wood cookstove) and undertook training of masons for the Chinese type fixed dome biogas plants in six districts and in the process got built every year more than 500 gas plants and built the same number of gas plants in its intensive work in Wardha district. Similarly, the smokeless choola programme was also undertaken in both the above areas through the assistance from the Department of Non–conventional Energy Sources (DNES). 20 to 25 of CSV staff got engaged in this work and in the interaction with the field programme, many new ideas came up.

Under the schemes for 'S&T for Women' and 'S&T for Weaker Section'–under the sixth five year plan programme for Science & Technology (S&T) some projects were taken up by CSV with assistance for DST. These were in the nature of extension of technologies evolved at the CSV. to be tested and tried in the field. Important amongst the techniques were :

(i) Soakage pits to absorb the effluents discharged by the village community wells and thus keep the environment clean and healthy.

(ii) Introduction of water drawing pulley at these wells which has ball bearings fitted in it and thus make drawing water easier and prevent the exle from being corroded by friction.

(iii) Preserving mud walls from rainwater erosion (specially in black cotton soil areas) by fixing village potter made red clay tiles on the outer surface of the wall.

(iv) Trial of simple and cheap pit lavatory (four feet depth) having clay rings and the seat being of brick panel.

(v) Organising the blacksmiths and carpenters of the area in learning techniques of making 20 improved tools and implements selected specifically to suit local conditions.

(vi) Giving the leather and hide artisans new leather technologies as evolved in C. L. R. I. Madras, to suit the local conditions and will enable them handle the hides of naturally dead which now get exported.

There are some research projects also continuing such as (i) biodynamic method of vegetable gardening as apploes to housaholders with little or no land (iii) Comparative study of fixed and movable dome gos plants.

The thrust of our activity now is sharing of the techniques evolved, tested, tried and proven successful in the field at CSV with other voluntary agencies working for rural upliftment through inputs of technologies for the poor by having training courses in these techniques to which representatives of the voluntary agencies are invited. This programme has been taken up with the help given by the Council for Advancement of Rural Technology (CART) – a body created by the Ministry of Agriculture and Rural Development under the Sixth Five Year Plan. Under the training programme the following courses are offered. (i) Biogas technology (3 months) (ii) Compost–making with only 2.5% cowdung (2 months) (iii) Pottery techniques without potter's wheel (3 months) (iv) Mud housing and sanitation (2 months) (v) Banana stem pulp boards (3 months). Two batches have taken courses so far 25–30 people being admitted in each batch.

In December we are having a one month condensed course in simple technologies as would help the development of women being organised at the request of voluntary agencies working for women and from next year a programme of training of women in the following subjects for a duration of six weeks, is to be undertaken all the year round with assistance from the DST under the 'S. T. for Women' scheme'. CSV also brought out two compendiums on 'Technologies for Women' at the instance of DST, which have published the two editions the first edited by Ms Vibha and second by Rajiv Gupta. These got very popular response and it is possible that a third version in a different form may have to be prepared and published.

Since CSV is working as a continuation of the work started by Mahatma Gandhi in 1934 for the place where its headquarter is situated at Maganwadi (the headquarter of erstwhile All India Village Industries Association) and the place where J. C. Kumarappa, the economist whom Gandhi entrusted this work, used to live. And since it was started in 1976 with Acharya Vinoba Bhave's blessings, he being a co–signatory to the CSV scheme, the philosophy of CSV is well reflected in Sarvodaya approach. Two of the publications of CSV is bringing this prominently they are, (I) Whither Science? (Rs. 10) (II) Four Phases of Human Development (Rs. 5).

The CSV is a small group of scientists and social workers. It is a registered institution with no financial base for a permanent support. It subsists on a project to project basis. It seeks funds from various Indian funding agencies for it projects and thus lives from year to year. It does require a cushion fund to maintain the core team and some infrastructural cost. For this CSV invites donations for which it is exempted under the 80 G. (Income Tax Act.) Each and everyone can help in this movement for a better and peaceful world through technologies that lead to social justice, ecologically balanced environment and a tension free self expressive mode of creativity through production, by helping CSV financially and / or giving time and talents to work for its programmes and / or sharing such information and literature as would be helpful.

Devendra Kumar
(The Editor)

* * *

Recall the face of the poorest and the most helpless man whom you may have seen and ask yourself, if the step you contemplate is going to be of any use to him. Will he be able to gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to Swaraj or self – rule for the hungry and also spiritually starved millions of our countrymen?

Then you will find your doubts and your self melting away."

GANDHIJI

Small Industries

Agro Based

NEW CASTOR SHELLER DEVELOPED

A new hand operated castor sheller capable of reducing the cost of shelling the castor pods, has been designed and developed under the farm implements and machineries scheme by a team of scientists working at the Agricultural Research Institute, Andhra Pradesh Agricultural Univetsity, The total cost of the implement is around Rs. 1200.

The low percentage of germination of castor seeds shelled by the traditional method might be due to the damage caused to the seeds by beating them with sticks. The total cost of shelling 100 kg. pods by the traditional method is Rs. 29 whereas with the new hand operated caster sheller it works out to only Rs. 20. The capacity of the sheller is 150 kg. of pods per hour. The shelling percentage is around 80.

The sheller consists of a wooden cylinder, a concave feed hopper and an outlet chute, all mounted on an angle iron frame. The cylinder is rotated through a hand crank and a set of gears to step up the cylinder speed. When the castor pods are fed, they get shelled batween the roatating cylinder and the concave feed hopper and the shelled material comes out of the outlet chute. The seeds are to be seperated from the hulls and the partly shelled pods by sieving and winnowing processes.

(NEWS TIME Date 2-5-1985.)

PINE NEEDLE FIBRE BOARD FOR PACKING FRUIT

Over 200,000 apple growers in Jammu and Kashmir and Himachal Pradesh have heaved a sigh of relief at the installation of the Rs. 65 lakh pine needle fibre board factory at Baijnath in Himachal for production of boxes for the fruit. Wooden crates used for this purpose are in short supply.

The factory has been set up on a turnkey basis by the Regional Research Laboratory, Jammu. According to the director of the laboratory, Dr. C. K. Attal, it is a pioneering effort in the field of fibre board technology and use of non–conventional waste resources.

The plant and machinery have been fabricated, designed and installed by scientists of the laboratory.

Of the 500,000 cubic metres of wood produced annually in Himachal 200,000 cubic metres are used for packing cases. The north western Himalayan region uses packing cases worth Rs. 70 crores annually for transhipment of fruit.

The plant provides direct employment to about 100 workers in addition to over 1,200 indirectly employed.

(THE STATESMAN
Date 4-5-1985)

FILTERING THE FRAGRANCE

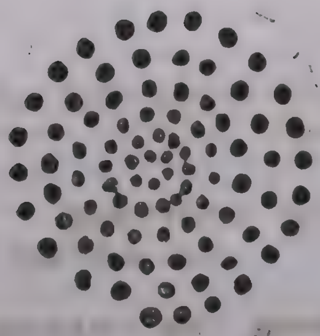
Oil from jasmine flowers is one of the precious and important ingredients used in the perfumery industry. Dr. N. G. Divakar, a consultant from Bangalore, India has developed a simple and effective process to extract jasmine oil.

This new technique involves the use of Whatman No. 1 filter paper. The filter paper is cut into small pieces and kept covered in an air–tight container together with mature jasmine flower buds for about 24 hours. At the end of this period, the container is opened and the filter paper pieces isolated. These pieces are immersed in acetone. After one hour, the solvent is decanted into another vessel and slowly evaporated on a water – bath. When the solvent completely evaporates drops of jasmine oil remain in the vessel.

The product compares favourably with the jasmine oil extracted through conventional methods while this new process is much cheaper.

* * *

RICE AND HEALTH



As per the figures for 1979, per capita net availabity of all cereals and pulses in India is 480.2 gms. per day. Out of it, the intake level of cereals is 453.3 grams which corresponds nearly to the recommended level. But the intake of pulses is only 44.9 grams which is nearly three–fourth of the desired level of 60 grams per day.

The function of food is three fold :–

1) To supply substances that make the body grow and repair the tissues as they get worn with use. These are called proteins.

2) To provide energy for various functions of the body, the heart to beat, the lungs to breathe, the muscles to move and the stomach to act on the food. This energy is supplied by fats and carbohydrates.

3) To maintain the human system in healthy working order : these minerals, salts and vitamins are required.

Rice is the staple food of more than half of the world's population. Its immportance in the Indian context is still greater as it forms a major food commodity for nearly two–thirds of India's population. Nearly half of her population depends on rice so much that they can not imagine life without rice. A peculiar characteristic of rice is that it is mostly eaten as milled whole grain whereas other grains are predominantly eaten after crushing or grinding.

Each rice grain in encased by an easily removable protective hull or bush. Inside the hull is the kernel of brown rice so called because of the dark bran layers or periearp covering the endosperm. In a depression at the end of the grain is the germ called embryo. Underneath the bran coating is a layer of protein–rice cells called the aleurone layer. Then there is starchy kernel forming major part of the grain.

The composition, constituents and properties of rice grain are influenced by the variety of the rice, climate, environment, agronomical conditions of growing, maturing, cultural and fertiliser practices etc.

The processing and milling courses bring further changes in the rice grain compositions.

Ordinary varieties of rice contain 10 to 15 per cent moisture. The rice contains very little quantity of fat less than 2.0 per cent–because major proportion of the lipids of rice is removed with the bran.

The total protein content of rice is lower than that of most varieties of wheat and also than that of whole corn. But rice protein has one of the highest nutritive values among cereal protein because of its high lysine contens

By experimenting on Rats, Monkey and Ariyama (japan) reported availability of qualitatively better and quantitatively more protein content in rice.

In degermed brown rice, the outer bran fraction (6 per cent by weight) contains 11 per cent of the total grain protein. By calculation the protein distribution comes to : bran 14 per cent and milled rice 83 per cent. There are four protein fractions in rice, viz, glutelin, prolamin, albumin and globulin. Of these glutelin (alkali soluble protein) constitutes 80 per cent in milled rice. The distribution of the rest is prolamin (alcohol soluble protein) 5 per cent. The proteins of white (milled) rice compares favourably in amino–acid content with whole wheat and whole corn protein; with 5 per cent level of protein intake, indicated biological values of 73 and 72 for rice and corn protein respectively while the corresponding value was only 67 for wheat protein with eight per cent level of intake. There is evidence, based on experiments on rats that the proteins in polished rice are superior to the proteins of enriched wheat flour.

Rice is the main source of protein in the poor rice eater's diet. While an increase in the protein content of typical rice diets is desirable, there is little evidence that protein deficiency is among the more important faults of such diets.

Mineral contents of rice are calcium phosphorus, iron, sodium and potassium. The concentration of minerals is found in the outer layers of rice than towards the centre. Because of low sodium and extremely low chloride contents, rice is a very suitable diet for hypertension patients. Average phosphorus content in unpolished and parboiled rice is more than double of the polished rice. Hence to preserve it, it is essential that the rice should be polished very little, say only 3–5 per cent.

A study on the effects of milling on minerals and trace element composition of raw and parboiled rice conducted by Y. G. Doesthale, S. D. Shankara Rao and B. Belavady reveals, " Parboiling per se had no effect on the composition of brown rice. The degree of milling and the initial cancentration of the nutrient in the grain determined the magnitude of loss on milling both in raw and parboiled grain. Zinc in rice grain was uniformly distributed and a major portion of other nutrients was concentrated in the outermost 2.5 per cent surface layers of the grain. Parboiling appeared to have altered the distribution of some nutrients in rice grain except for zinc, magnesium and copper. Milling losses for other nutrients were therefore significantly lower in parboiled than raw rice."

Vitamins like other cereals the percentage of fat soluble vitamins A and D – in rice is negligible. Similarly ascorbic acid and vitamin B 12 are in traces only. On the other hand vitamin B 1, B 2, nicotinic acid and vitamin E content is considerable in the whole rice. It has been established through various experiments all over the South and East Asia that less polished or hand pounded rice is the readymade remedy for eradication of beriberi. The outer layers of rice consisting bran contain 65 per cent of the thiamin of brown or raw rice, exclusive consumption of polished rice which is low in thiamin is known to result in beriberi a deficiency disease common among children and nursing mothers of rice eating countries in Asia. Besides thiamin, rice is a good source of pantothenic acid, Pyridoxine and vitamin E.

Parboiled rice is superior in vitamin B 1 than raw because of diffusion of the nutrients from outer layers into the kernel. A painstaking epidemological inquiry by scientists has shown that those who eat parboiled rice usually escape beriberi and other deficiency diseases.

Calorific Value of Rice.

Rice is predominantly a carbohydrate high energy food. The average food energies in rice (per 100 grams of rice) as given by Watt and Marrill (1963) are : Unpolished rice–360 K. cal (77%): Milled rice – 363 K. cal (88%); parboiled rice – 369 K cal (–); Bran – 276 K. cal (51%) – Carbohydrates.

Vitamins are lost most by washing and cooking. Since the B group vitamins are water soluble hence the pre – cook rinse or traditional wash of rice severely deprives the nutrient contents like thiamin, riboflavin and niacin. Similarly, cooking in excess wat which is discarded after cooki also causes significant loss vitamins. Loss of vitamins washing and cooking in exc water is estimated to the extent 50 to 65 per cent. Therefore, conserve these vitamins to optimum degree and minimise lo it is essential and advisable t pre–cook rinse should be as m as possible and it should be cook in water just required for purpose. Other nutrients may a be lost by poor washing and co ing methods. In this way, as mu as 10 per cent protein, 50 per c of Ca and P, 74 per cent of Fe a 15 per cent of the calories co be lost (Ranganathan et al 193 However, parboiling reduces th considerably.

[KHADI GRAMODYOG
– September 198

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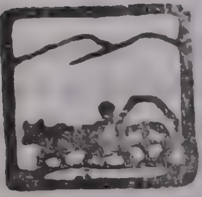
How Good is the Biogas ?

The volume of biogas produ is the easiest and in most c sufficient to judge the efficienc a biogas plant. But biogas c sists of approximately 60 per c methane and still about 40 per c carbon dioxide which has no orific value. The methane con in the gas could be enhance some method. But how to meas the methane and carbon dio contents ?

Mr. Roland Schnell of Be West Germany has develope biogas analysis apparatus w measures the methane co ntration in the biogas.
(SOURCE : TECH – MONITC
March–April 1985)

ENERGY NEWS

Bullock power



Development of a Self — Breaking cart

An enterprising American, Mr. Terry, Habshoy, visited Delhi with the new design of a modern bullock cart with differential brake wheel axle made of rejected heavy duty tyres.

He further challenges that it is far more superior in its capability and longivity than the indigenous cart. The differential and self – breaking system will increase efficiency of the cart with the result that the vehicle owner will be in a position to feed well the animal and maintain the vehicle.

Mr. Habshoy insists that rejected tyres are as good as new for the defect which results in their being rejected hardly matters for cart purposes. They are less expensive than Indian tyres, can be imported for Rs. 580/– a pair against Rs. 1,800/– in India. 100 million such rejects are available in the U. S.

Underlining the importance, such modernised model Prof. K. S. Ramaswami told that bullock carts carry goods worth Rs. 40,000 crores a year. Fifteen million carts in India carry two–thirds of rural freight and transport 20 million tonnes of freight in the urban areas.

Mr. Ramaswamy who is championing the cause of mute animal told the newsmen that it would be accessible to rural dusty road without straining the animal. Although it costs eround Rs. 5,000 than the traditional one costing 4,000/– but it could carry five tonnes as against about 2 tonnes in the traditional one.

Development of Manual/ Bullock-Operated Oil Expeller:

As per agricultural statistics, 40 percent of landholding is shared by small farmers who hold less than the land.

A study conducted by a team of scientists and engineers in the Malda districtof Madhya Pradesh revealed that marginal farmers and adivasis use indigenous oil expeller such as 'petula' bullock-operated kolhus for extracting oil.

It was realised that those expellers have become highly inefficent and out–dated contrasting with the mechanical worm type oil expellers which are monopolised by a bunch of businessmen who drain away all the profits from poor farmers by purchasing the oilseed on low cost and extracting the oil on highly efficient mechanical expeller.

This pathetic state of poor Indian farmers led our scientists to develop mini oil expeller operated manually or by bullock which suit the pockets of small farmers and also get high oil recovery.

With these objectives in mind, they tried several pressure techniques but these were found quite ineffective. Thus, the scaled down model of worm type oil expeller was developed to be operated manually or by bullocks.

These worm type expellers brought about 85 percent of oil recovery in first part while rest of 15 percent is obtained in second and third parts.

Power From Trees

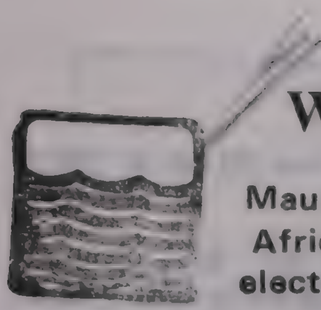
Experiments being condeucted by Dr. S. P. Kosta, Deputy Director of the Indian Space Research Organization show that plants & trees can be source of electricity. The plant varieties included in the experiments are of diverse range; banana papaya, mango, red rose, figleaf, etc. Even vegetables like tomato, brinjal, beetroot, radish, onion, potato and green chillies are proved to generate electricity of varying intensities.

The principle involved is to form electro–chemical cells in plants by piercing small electrodes into the leaf branch and stems of live trees and plants.

He connected 38 cells of the jungle variety of phyllocactus plant in two rows of 19 cells each in parallel order and later on combined them in series. The two volts of electricity generated from the series was used to light an electric bulb (2v 14 milliamperes) in the flickering mide. An LED was also lighted for about an hour continuously.

As trees are continuous masses of sap Dr. Kosta says, they have a vast potential of generating power, the basic principle is ionization.

(Source : Tech-Monitor May–June 1985.)



WAVE POWER

Mauritius may be the first African nation to reproduce electricity from wave Power

A project being developed for the countrys' southerly Riambel Bay could generate up to 20% of the island's electricity needs. Since tow-thirds of all African nations have constant wave action on their shores, this could also encourage projects in other countries.

A sloping wall will be built, using a coral reef in the Indian ocean as a base. The wall will be linked to the shore by sidewalls. Wave would wash into the created lagoon and fill the reservoir to power an onshore electrical station.

The lagoon would also offer favourable conditions for fish farming such as warm, moving seawater, good oxygenation from the wave action, and plankton and small fish washing into the tank. It is thought the value of fish harvested from the lagoon could exceed the value of generated electricity.

SOAP EFFLUENTS USEFUL FOR CROPS

Effluents of soap and vegetable oil industries can be used in agriculture for irrigation and as plant nutrients after proper dilution These conclusions were reached by environmental experts of the zakir Husain College of Engineering and Technology of the Aligarh Muslim university in the experiments jointly conducted by Dr. mohammad Ajmal and Dr Ahsanullah khan.

The experiments showed that undiluted effluent significently retarded the germination and growth of pea and mustard crops. whereas when diluted to 75 per cent it enhanced it. This was because it was found to contain considerable amounts of plant nutrients like phosphorus, potassium and calcium.

The results published in a reputed journal on environmental pollution in the U.K. suggest that such an effuent would be highly beneficial for irrigation and can also fulfil the manure requiraments of the crops. (Source : FINANCIAL EXPRESS Dated 7.7. 1985.)

BOOK WATCHING

Energy Directory of Indian Specialists in Energy :

Complied by :- Tata Energy Research Institute Documentation Centr, Bombay House, 24 Homi Mody Street Bombay 400023.

1979,pp.113

The purpose of this directory is to identify and facilitate communication with and between active participants in the energy field, information about 375 individuals. The main text of the directory is an alphabetical listing of specialists by their surname, their academic qualification and areas of experties.

Cook Stove Directory

Compiled by : Tata Energy Documentation and information Centre. More then 40 institutions or research centres working on cookstove in different countries, their information summarised in the Directory along with inter publications and activities.

Appropriate Technology for Health-Directory

Compiled by : World Health Organisation, 1211 Geneva 27, Switzerland. 3rd Edition,1980 pp 199.This Directory mostly useful for those working in ATH field includes 418 entries from 83 countries.Organisation. institutions group, and individuals concerned and involved in the development of health and health related appropriate technology.

गरीब की झोपडी औंर राष्ट्र की आधुनिक विज्ञान-प्रयोग शालाओं के बीच सेतु का
काम करनेंवाली हिन्दी की पहली पत्रिका -

ग्रामोंपयोगी विज्ञान

वार्षिक शुल्क : ५ रूपये (व्यक्तिगत) १० रूपये संस्थागत पता : ग्रामोपयोगी विज्ञान केंद्र,
मगन संग्रहालय,वर्धा ४४२००१ (महाराष्ट्र)

NEW NEPALI COOKING STOVE

The stove is designed for improved wood burning cooking to make kitchens smoke less and to use less firwood.

The stove desigh corresponds very much with the traditional know cooking facilities in many Nepalese houses the stove has two cooking holes the fire is under the front cooking pot and the second pot is being heated mainly with hot air.

The smoke will be taken out of the house through the attached chimney pipes. The stove and pipes are prefabricated at potters places. This proves to be a good means of technology transfer, as in this way the crucial measurements are being made by trained potters. The installation of the different parts can the be done quite easily by those villagers who have had an introduction in this new technique

PREFABRICATED STOVE SET

A complete stove set consists of five pieces and the chimney pipes.

1) stove : The stove and the appliances are made of fired clay. They are fitted together at the site by simply using clay as a bonding material.

2) mouth piece : This piece is fixed to the entrance of the stove. it serves mainly as a supporting piece, to carry the top layer of clay.

3) Conector : The small pipe of square shape conuects the stove and the chimney pipe. It has a slit to house the metal damper.

4) Damper: This flow-adjusting device is made of sheet metal. It serves as a draft regulator, thus reducing the hot air flow through the chimney pipe

5) Bottom Piece : This piece connects the stove with the chimney pipe. The bottom holes are for the cleaning purposes, there are two holes for either right or left-hand access. The hole at the will be closed permanently with clay and the front with a stone sealed with clay.

This clay will be removed every three to four months in order to get rid of the accumulated soot.

INSTALLATION

The installation of prefabricated stove and chimney pipe is quite easy. The time required is two to three hours.

For moderate and warm climate : use dry material(rubble) to fill the hollow gaps between the stove and the surrounding walls. This acts as an insulator and reduces the heat transfer.

CHIMNEY PIPES

The length of chimneys should be three meters in height, at least, and go, where evere possible, above the roof.

FIRE HAZARD

Chimneys must be at a certain distance from wooden or other burnable materials(15 cmat least) The Chimnely pips have to bec fixed in such a way, that sockets are not inside the celings ar walls and they are at last 20 cm or more form ceilings.

Chimneys need to be cleaned regularly (every three or four months) for this the top pipes have to be removed and thebottom opening used for cleaning. The cleaning can be done with a brush or cloth fixed to a long stick.

where the chimney pipe exit is near a thatched roof a piece of fly screen can be fitted, this prevents sparks from getting out of the pipes.

FUEL EFFICIENCY

Greater efficiency can be achived by paying attention to the following points:

Make sure that the cooking pots sit snugly on to the cooking stove.

Keep the damper closed as much as possible

Use small pieces of wood

Use dry wood

Keep the fire small and cook slowey

Keep covers on the pots

Use metal pots, and where possible pressure cookers

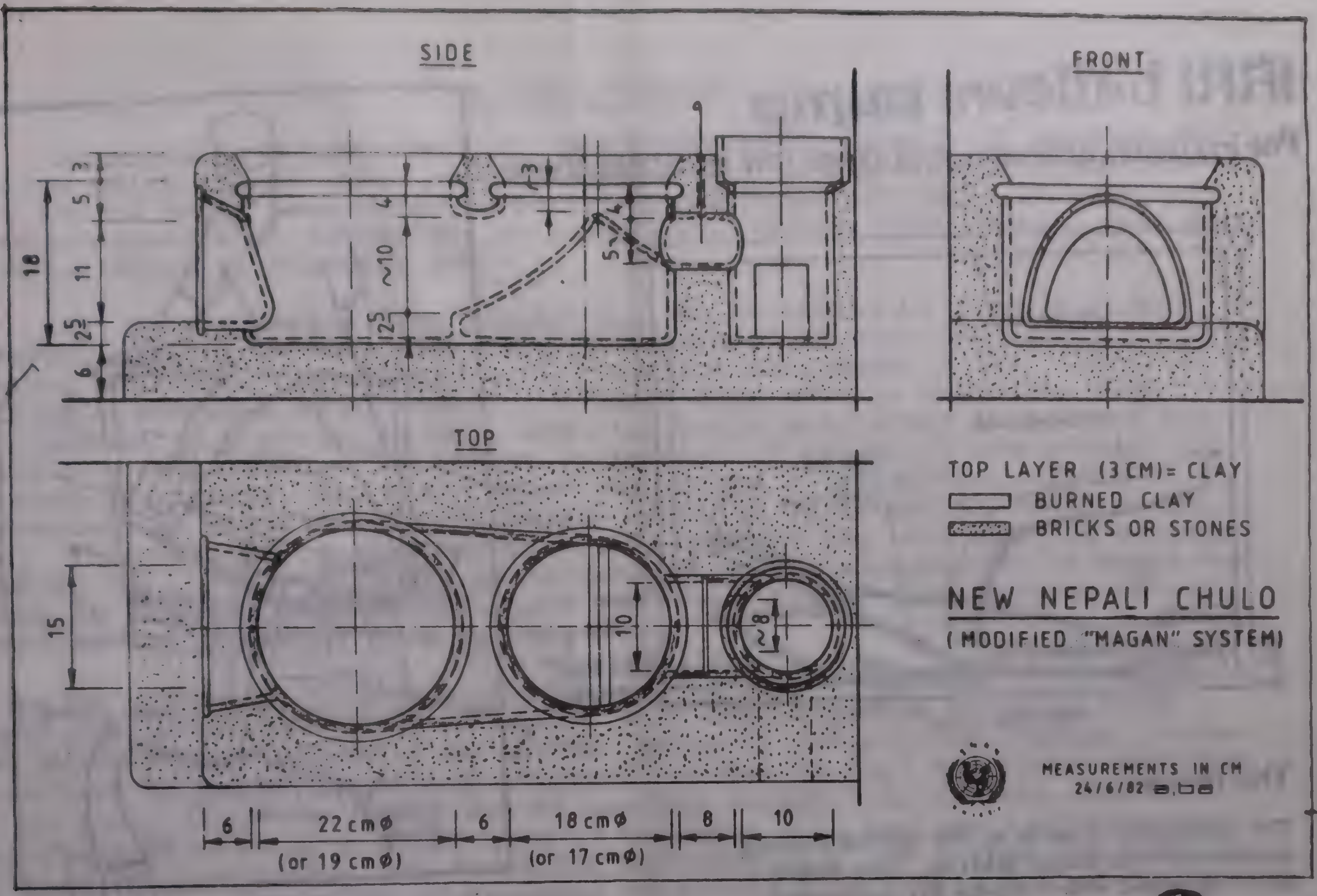
Keep doors and windows closed in cold climate

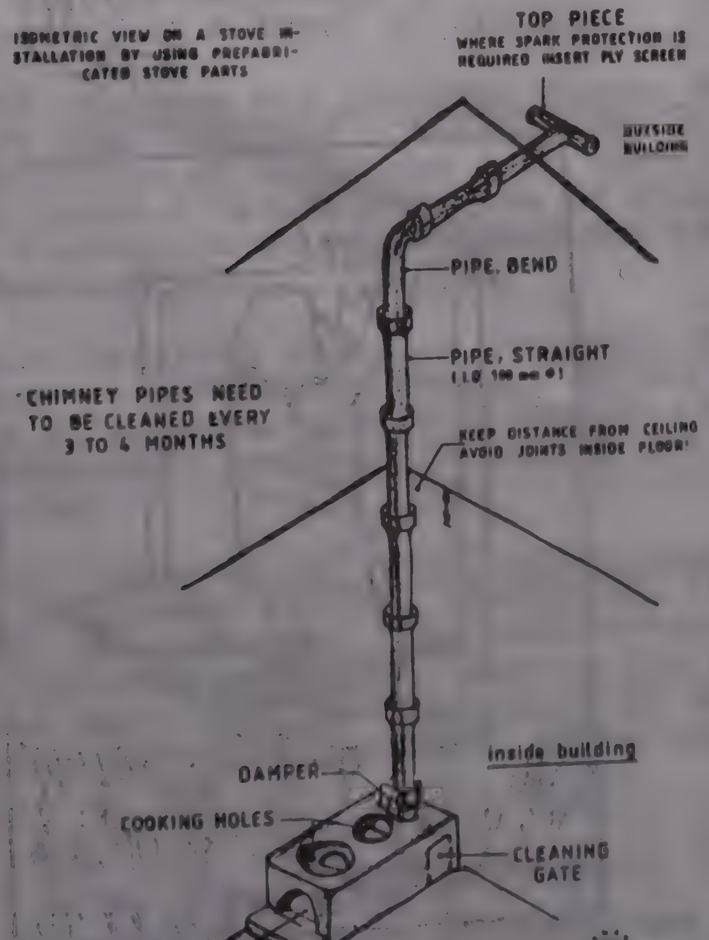
Remove charcoal and wood when the cooking is finished and extinguish them with water

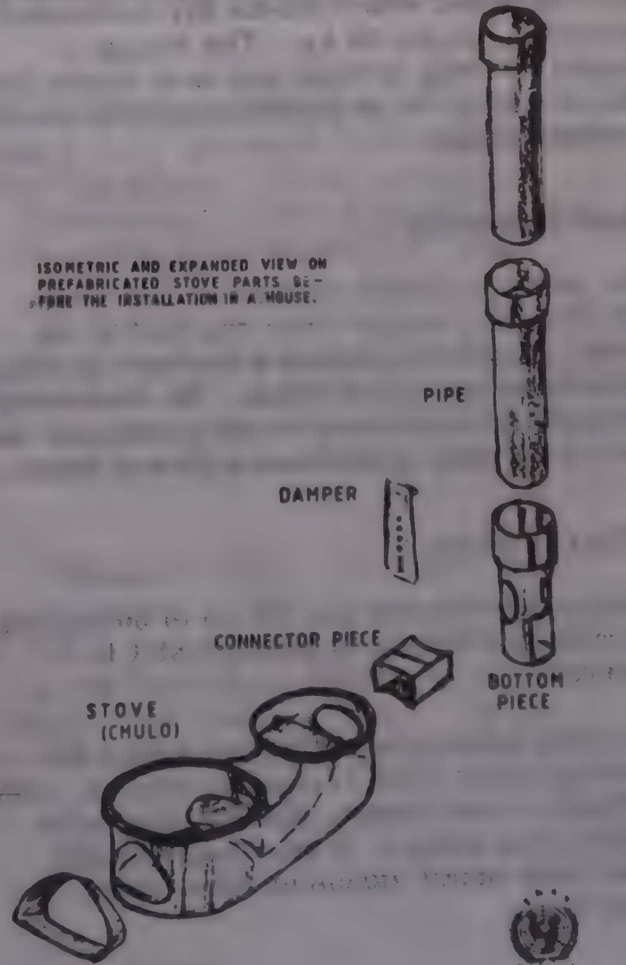
Close damper after cooking to keep the stove warm; [where warmth is required)

Clean chimney pipes regularly for fule efficiency and safety.

★


SIDE
FRONT
18
3
5
11
2.5
6
4
~10
2.5
3
4
5
TOP
15
10
~8
6
22 cm Ø
(or 19 cm Ø)
6
18 cm Ø
(or 17 cm Ø)
8
10
TOP LAYER (3 CM) = CLAY
BURNED CLAY
BRICKS OR STONES
NEW NEPALI CHULO
(MODIFIED "MAGAN" SYSTEM)
MEASUREMENTS IN CM
24/6/82 a.ba

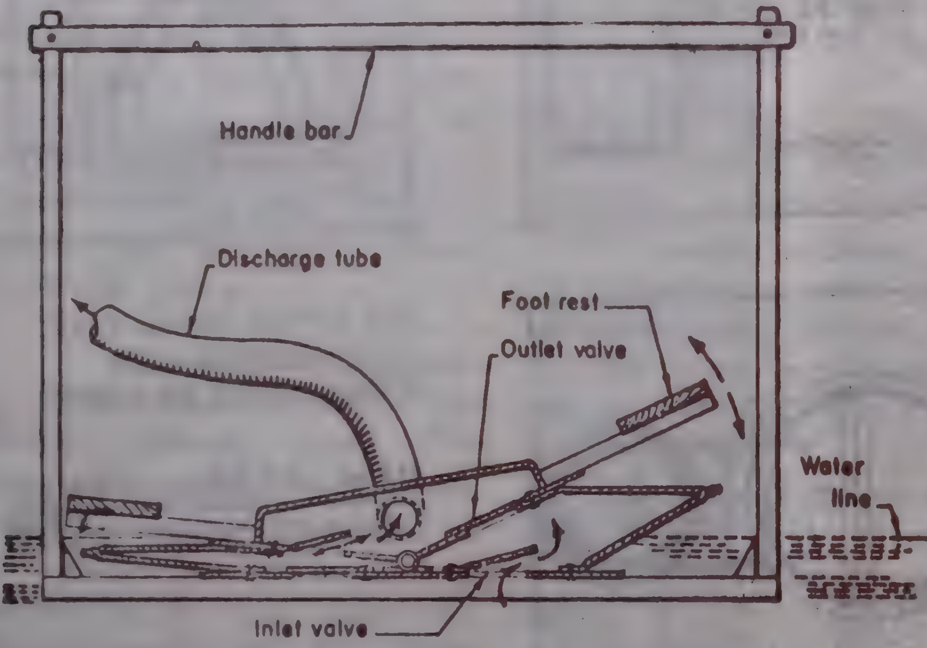

ISOMETRIC VIEW ON A STOVE INSTALLATION BY USING PREFABRICATED STOVE PARTS
TOP PIECE
WHERE SPARK PROTECTION IS REQUIRED INSERT FLY SCREEN
OUTSIDE BUILDING
PIPE, BEND
PIPE, STRAIGHT
(I.D. 100 mm Ø)
CHIMNEY PIPES NEED TO BE CLEANED EVERY 3 TO 4 MONTHS
KEEP DISTANCE FROM CEILING
AVOID JOINTS INSIDE FLOOR!
inside building
DAMPER
COOKING HOLES
CLEANING GATE
FIREWOOD
7/82

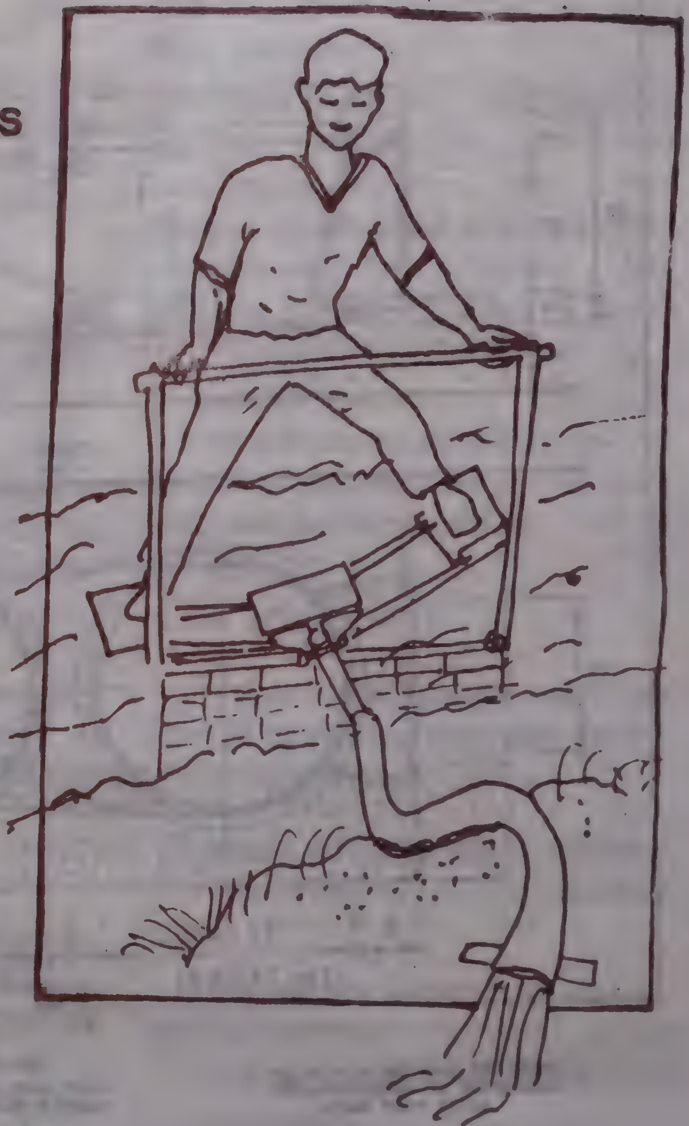

ISOMETRIC AND EXPANDED VIEW ON PREFABRICATED STOVE PARTS BEFORE THE INSTALLATION IN A HOUSE.
PIPE
DAMPER
CONNECTOR PIECE
BOTTOM PIECE
STOVE (CHULO)
MOUTH PIECE
6/82

Drawings are from UNICEF's booklet: "New Nepali Cooking Stoves", available from UNICEF, P.O. Box:1187, Kathmandu / Nepal

IRRI bellows pump

For irrigation, drainage, and other low lift applications





The pump

The foot pump is made of two canvas bellows reinforced with metal inserts. The entire unit, equipped with a handle for convenient carrying, weighs 20 kg. The design is rugged for long service and easy repair yet simple enough to be manufactured by small machine shops.

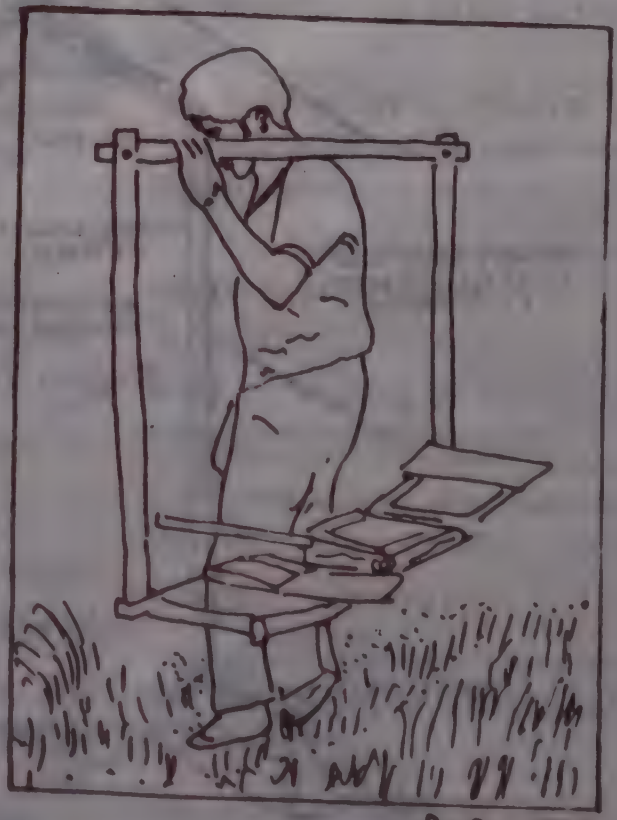
How it works

The operator stands on the two foot rests and shifts his weight from one foot to the other. This compresses a bellows, forcing water from the outlet valve. By alternately shifting his weight in a rhytmic manner, the operator pumps a continuous flow of water.

What it does

This low-cost pump can lift 50 to 60 gallons of water per minute to a height of 1 to 2 meters.

The IRRI bellows pump is well suited for pumping water from irrigation ditches, open channels, river banks, and shallow wells. Unlike most pumps, it can handle muddy water with small stones or other solid impurities.



Po Box 583
Manila

Developed at the Agricultural Engineering Department, International Rice Research Institute, Los Baños, Laguna, Philippines, under a research contract with the U. S. Agency for International Development, Washington, D.C.

TOXINS IN FOODS

Undesirable constituents in food pose health hazards of serious dimensions which are of great practical relevance to public health nutrition. These toxins could be naturally occurring, produced by fungal infestation, orcontaminatesdue to accidental or intentional mixing with foods. Some of the major areas of research are:-

a) Aflatoxicosis from Groundnut: It is caused by a toxin, named aflatoxin. Owing to unsatisfactory post harvest storage conditions in our country, aflatoxin contamination of groundnut is common. The liver is strikingly affected by aflatoxin. Malnourished animals suffering from deficiencies of protein, vitamin and riboflavin were found to be more susceptible to aflatoxin. The higher percentage of aflatoxin was present in the milk of animals, fed with higher percentage of aflatoxin. There is one variety of groundnut from Junagadh which is resistant to toxin elaboration. This variety is agronomically superior and has more than an average yield in oil. This character of resistance to the elaboration of toxin was stable in different agroclimatic and soil conditions. Cultivation of such varieties has therefore been recommended.

b) Argemone Poisoning and Epidemic Dropsy: Outbreak of epidemic dropsy due to contamination of edible oils with Argemone mexicana have been occurring sporadically in several parts of India. The disease is characterised by gastrointestinal symptoms, oedema of face and limbs, erythema and in a few instances death due to cardiac arrest. Edible oil contains sanguinarine which is a toxic agent. Argemone oil, besides sanguinarine, may also be responsible for the toxic manifestation. A method has been developed for the detection of argemone in edible oils. This method detects contamination at a level of one ppm.

c) Mustard Oil contains Erucic Acid: Deleterious effects of this acid have been reported. Animals fed with mustard oil showed sarcoplasmic vacuolation of right and left ventricular myocardium. Some animals also exhibited a variable degree of myocardial fibrosis. The significance of this finding is to be examined particularly in those habitually consuming mustard oil.

Carcinogenic residues in edible oils could arise from subgrade solvents used in extraction process or due to deliberate or accidental contamination of mineral oils. A systematic study is in progress to examine the carcinogenic residues in edible oils processed by the solvent extraction process.

d) Lathyrus sativus Causing Lathyrism: 'Kesari Dal' is less expensive than other pulses; therefore, is commonly used. This has given scope for adulteration. The continuous use of this pulse causes paralysis of leg called lathyrism, due to the toxin. A method has been developed to remove toxin from it by soaking it in hot water for two hours. Water is removed and pulse is dried. This method was found to remove all the toxicity.

Source:

National Institute of Nutrition,
Indian Council of Medical Research,
Hyderabad - 500(.007 (A.P.)

CARRYING WATER BY ROLLING BARREL

The process of carrying water is commonly used in the South of Tunisia. In the rural zones, carrying of water is generally the work of the women. Instead of the jug containing 10 to 15 liters of water, the buckets of tin on plastics is used. For long distances, the animal does the work (ass, camel, mule) of carrying by either two wooden barrels (2 times - 20 litres) or two plastic tins (2 times - 30 litres) and for pulling other alternatives are either a rolling barrel (200 litres) or a tank on a trailer (500 litres).

The rolling barrel, containing 200 litres is enough for the daily needs of an average family. It combines a good capacity and is simple to make and easy to pull.

Construction :

An old drum of oil, with rigid inner-sides and edges of 2 or 3 cms, will be joined or welded in the middle.

- Fixing of axles on the sides for harnessing the drum.
- Fixing of a reinforcement encircling.

1. **Fixing of the axles**

   For preventing from boring the drum, a system of crossing, made with metal blades of length 57.5 cms., width 4.5 cms., and thickness 3 mm., is soldered perpendicularly and also on the internal edge of the sides of the barrel. At its center, a hole of 2 cms. let pass an iron rod of length 2 10 cms., which will be soldered. The other tip will be hammered to prevent from loosening of the harnessing system.

2. The system itself is made with the same round iron of 1.5 cms. One of the tips will be formed as ring around the axle, the other one will get an hook for having the harnessing bonds. For more rigidity and cohesiveness, the two rods are connected with an iron rod of same diameter and the length - 96.5 cms.

2. **Fixing of the reinforced cement circling**

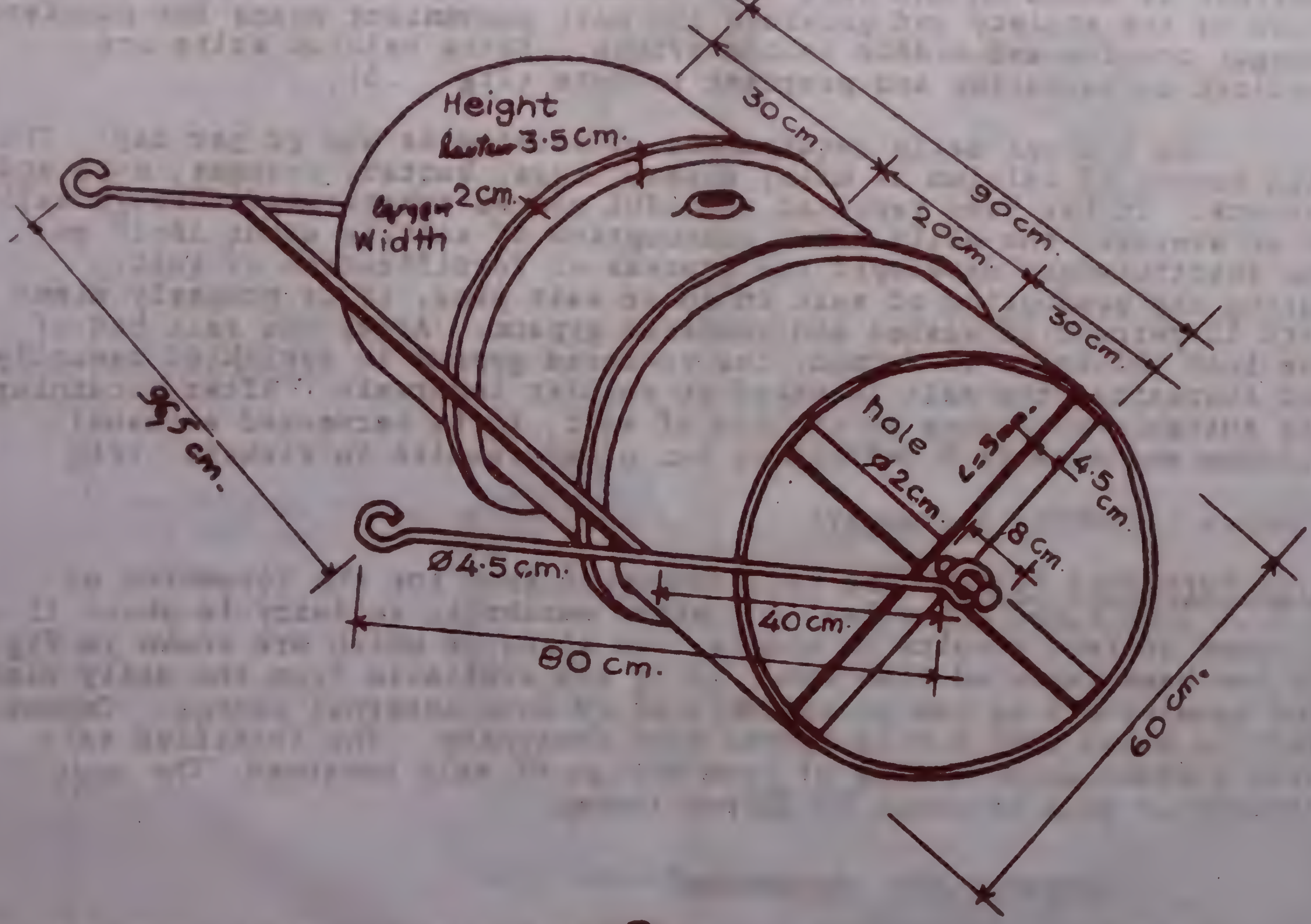
   For preventing from the deterioration of the barrel and especially of the closing system, and for helping its rotation, two circles are reinforcing the system. They are fixed at 1/3 from the distance of the edges. In section that circuling has an height of 3.5 cms. and an width of 2 cm.

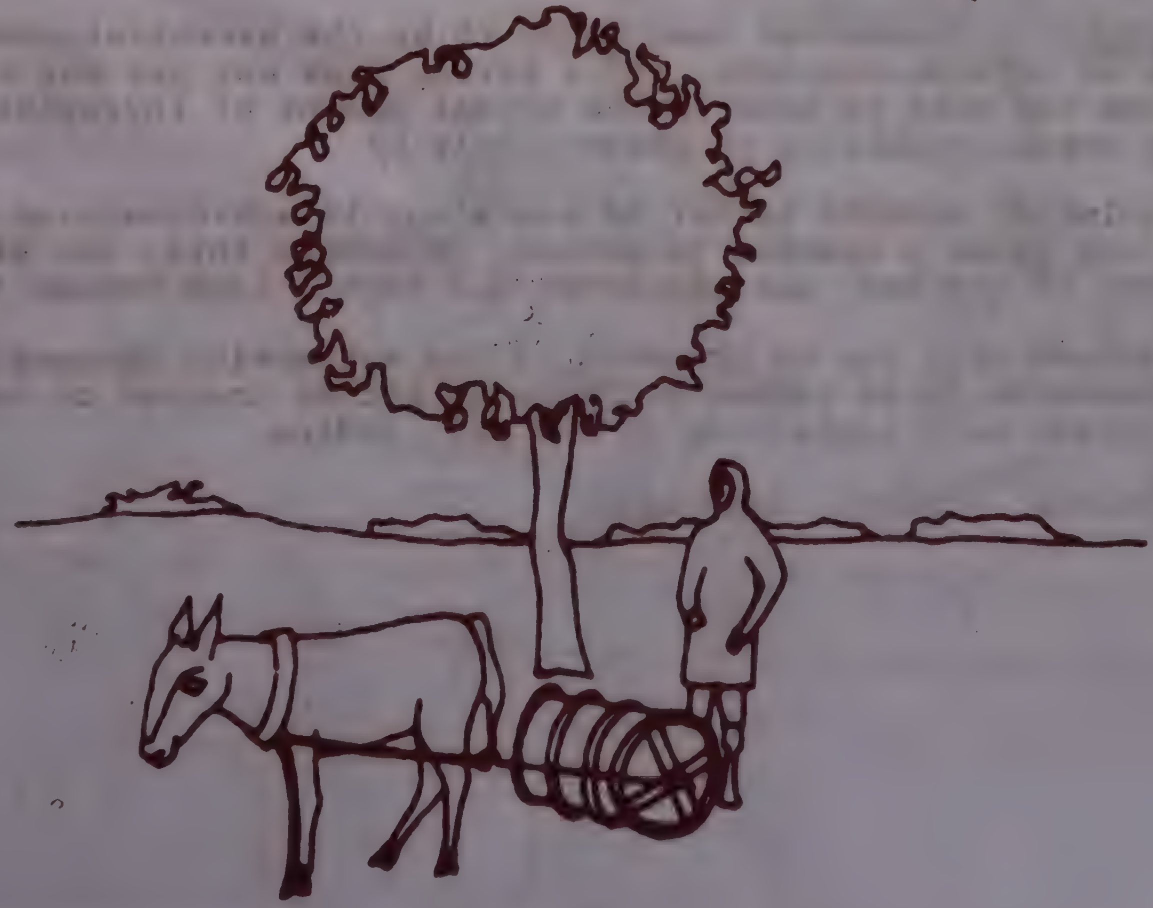
Use :

Between the water point (springs, well, etc.) and the homes, the barrel is generally pulled by the ass or the mule. In Tunisia where camel is often used for the field works, it is frequent to see that animal making such a pulling of the rolling drum. That barrel is sold at Tunis for 25 dinar (about Rs. 600).

For further information : ASDEAR 10 rue Eve Nohelle
Tunis Tunisia

CARRYING WATER BY ROLLING BARREL


Height
3.5 cm.
Larger 2 cm.
Width
30 cm.
90 cm.
20 cm.
30 cm.
hole
ø2 cm.
L=3cm.
4.5 cm.
8 cm.
95 cm.
ø4.5 cm.
40 cm.
80 cm.
60 cm.



HEALTH-SALTS

Calcium Fortified Salt : The concept of fortification of salt with nutrient is based on the fact that common salt is consumed by all sections of the society and provides the most convenient means for nutrients amongst the low and middle income groups. Extra calcium salts are required by lactating and pregnant mothers (Fig .5).

The average daily requirement of calcium is one gm per day. The rich source of calcium is milk, cheese, eggs, butter, oranges, nuts and carrots. It has been reported that 50% can be substituted through salt. On an average, the daily human consumption of salt is about 18-20 gm. The Institute has developed the process of fortification of salt. During the production of salt in solar salt pans, it is properly mixed with 10 percent of washed and powdered gypsum. After the salt bed of one inch thickness is formed, the powdered gypsum is sprinkled manually and thereafter the salt is raked at regular intervals. After attaining the suitable thickness of the bed of salt, it is harvested as usual. Calcium and vitamin D deficiency can often results in rickets. (Fig .4)

(Source : CSMCRI, Bhavnagar)

Iron Fortified Salt : The requirement of iron for the formation of R.B.C. (red blood copuscles) and other metabolic activity is about 15 mg. A lower content results in anemia, the signs of which are shown in Fig. 3 It has been reported that about 10 mg are available from the daily diet and remaining 5 mg has to be supplied by some external source. Common salt is mixed with 0.001% ferric pyro phosphate. The fortified salt will contain about one mg of iron per gm of salt consumed. The cost of production will be about Rs 30 per tonne.

(Source : NIN, Hyderabad)

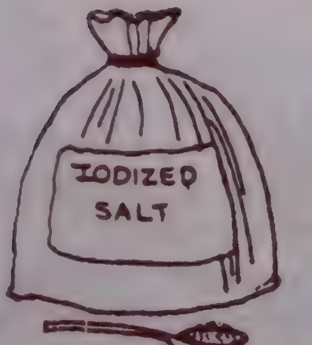
Iodised Salt : Iodine has been found to be the essential component of thyroxine or tri-iodothyroxin. If a person does not get the required iodine from his diet to make up the normal amount of thyroxine, the thyroid gland may swell, resulting in goiter. (Fig.1)

In India, endemic goiter is prevalent in sub-Himalayan region ranging from Jammu & Kashmir to Assam. To combat this, the estimate requirement of iodised salt is about 3.5 to 4.5 lakh tonnes (Fig .2)

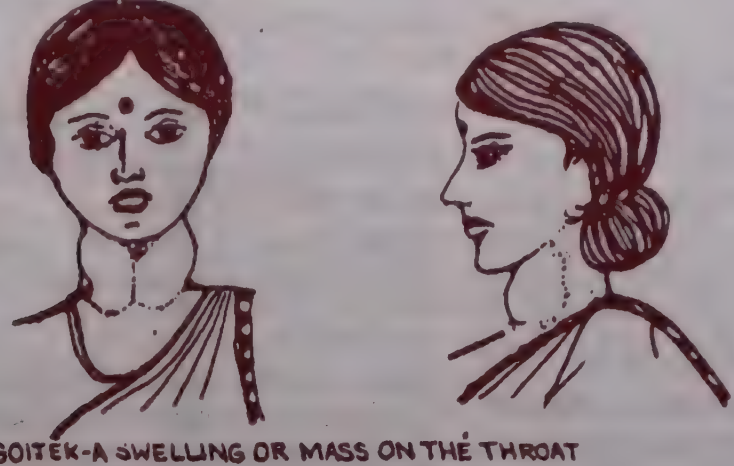
Iodised salt can be prepared by the submereion process. The salt after submersion in an iodate solution is either drained or centrifuged to get iodised salt containing 15 + 2 ppm. iodine.

(Source : CSMCRI, Bhavnagar)

HEALTH-SALTS

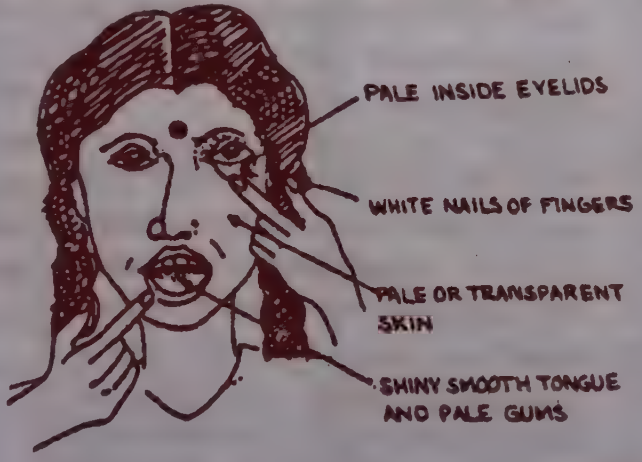

IODIZED
SALT

TAKE IODIZED SALT FOR
GOITER PREVENTION
Fig. 2



GOITER-A SWELLING OR MASS ON THE THROAT
MOSTLY CAUSED BY LACK OF IODINE IN DIET
Fig. 1

IRON DEFICIENCY IN
THE DIET LEAD TO
ANEMIA


PALE INSIDE EYELIDS
WHITE NAILS OF FINGERS
PALE OR TRANSPARENT SKIN
SHINY SMOOTH TONGUE AND PALE GUMS

SIGNS OF ANEMIA Fig. 3

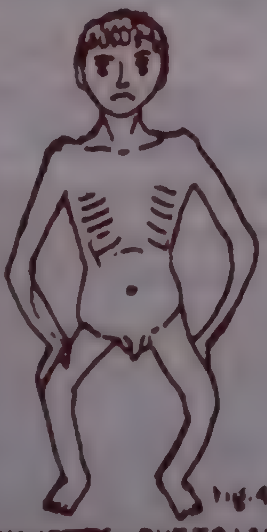
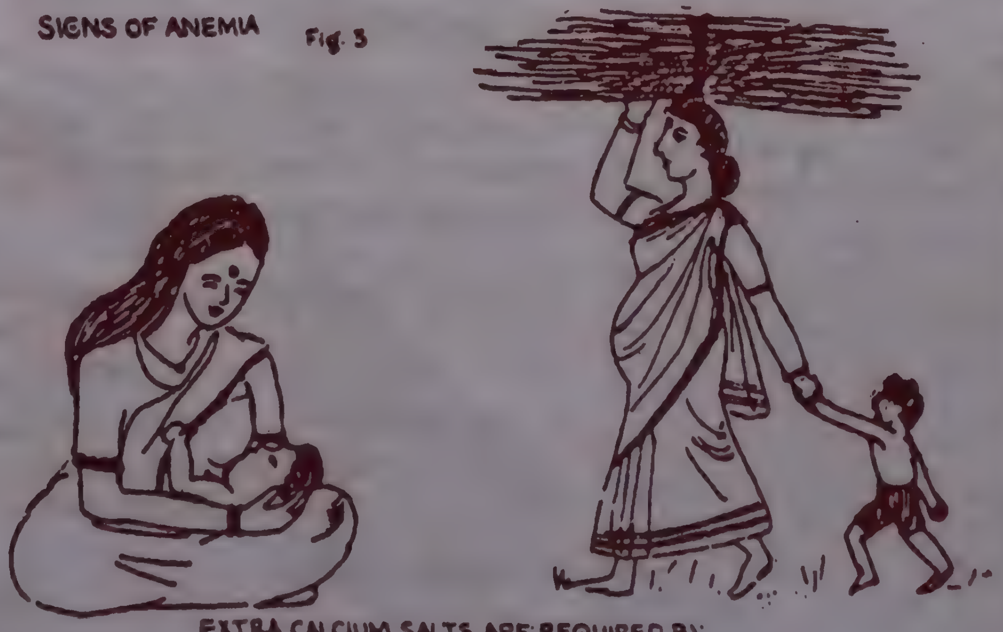


Fig. 4

RICKETTS -DUE TO LACK
OF VITAMIN-D AND
CALCIUM DEFICIENCY



EXTRA CALCIUM SALTS ARE REQUIRED BY
LACTATING AND PREGNANT MOTHERS
Fig. 5

Promoting scientific Intrest in Youth

Here in is two schemes ounder the ministry of S&T. Dept.of Scienc & Teachnology for the promotione of scienticie interst in youth to where one can write to STp Divison, DsT,Technology Bhavan New mehruli Road, New Delhi- 16

I) Scheme for promotion of Scientific Interest in youth

Objectives : (i) To promote and sustain scientific interest in youth during their creative period of career (ii) To provide opportunities to young scientists for pursuing exciting and innovative research ideas, (iii) To provide opportunities for inte raction and exchange of ideas with scientific community etc.

who can apply: The scheme covers young scientists in the age group of 18-35 years. young scientists who have adequate back ground in any field of science and Technology and show inclination to undertake an activity for the fullfilment of the objective of the scheme.

Activities: (i) Creativity Encouragement projects of about two years duration requiring seed-money upto Rs. 1·0 lakhs (ii) Socio-economic Development projects (iii) Seminars/ Symposia (iv) Awards through INSA and ISCA. (v) Contact programe with eminent scientists, (v)International Travel Assistance.

when to apply : Any time on the prescribed format obtainable from DST.

II Science and Engineering Research Council-young Scientists Scheme

Objectives: (i) To provide quick research support to young scientists to pursue their bright pidia in newly emerging and front line areas of research in science and Engineering. (ii) To work for integrated research programmes involving inter-disciplinary fields. (ii) To support inter-institutional programme.

who can aqply: The scheme is open to young scientists below 30 years. Researchers & scientists who have shown promising achievement during their ph. D and or subsequent work are eligible. Applications need not be forwardedoruted through any institutions at this stage but once the proposal is approved a certificate of affiliation to an institute is necessary.

Duration and financial limit

projects under this scheme would be sanctioned for a period of 2 years. The total cost of the project for this period should not exceed Rs. 2.5 lakh.

when to apply: The project proposa in 5 (five) copies should reach Department of science and Technology by 31 st january and 31 st july of each calendar year, on the prescribed form.

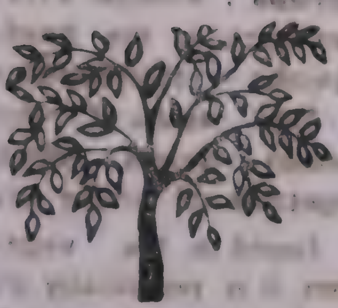
ASHOKA FELLOWSHIP

ASHOKA FOUNDATION invite applications for its fellowship programme for 1986. The fellowship is intended for support to highly motivated, competent and creative individuals who wish to launch public service and public cause initiatives. These should be self-designed and self managed projects in such fields as environmental protections,ecologically-sound-development, community health, poverty alleviation, consumer interests, civil liberties and human rights, educational and social reconstruction, cultural regeneration, peace action or any other sphere of contemporary human concern selected by the candidate.

The selected fellows will be provided a personal stipend, sometimes working expenses and advisory service for a period of one ro four years after which the fellow is expected to become self-reliant. Those interested are requested to write to the following address giving an outline of their proposal accompanied by a brief biodata.

Kishore saint Executive Director Ashok foundation 11.A Fatehpura UDAIPUR–313 001

Regd office : 59 Regal. Building Connaught Circus, New Delhi 110001
Tel: 321943/323215
Telx 31.61350 NFw IN



IN PRAISE OF SHRUBS-The Neglected plants

(Abstracted form'CERES'- the FAO magazine Vol.2 No 3. is this article bringing out how important it is to develop these economic shurbs for poor soils, poor rains and poor people for it is 'one life form that has the most security' (Editor).

Shrubs are a botanical resource without a constituency. Too tall for agriculture, too short for forestry, they fall between the two disciplines. Agricultural textbooks do not discuss shrubs nor does forestry literature. Institutes of agronomy and forestry research abound, but try to find one for shrub research. shrubs are either too woody, too branchy too thick, or not thick enough. And therefore their pontential as resources is over looked.

Yet shrubs can provide many valuable resources-food for people, feed for animals, ingredients for durgs and medicines, wood for fuel, fibre for paper pulp materials for housing, fencing, tools, and handicrafts as well as industrial products such as rubber resins, gums oils, and rope. On top of that, Shrubs are one of the most promising answer to the Third World's massive shortages of firewood.

Shrubs are small many-branched trees. Like other classes of plants, they may be annulas or perennials, Many grow in the most derelict terrain. A number of them (notably legumes) fix nitrogen that benefits soils and neighbouring plants. Shrubs have particular promise for developing countries because they are one of the most vigorous and tenacious of all life forms. Their often deep tap oots and extensive lateral-root systems allow them to tolerate drought and barrenness, often providing the means of survival for live stock and wildlife. This is because grasses die when the upper soil dries out, but the shrubs deeper and more extensive root system reaches underground moisture and keeps them flourishing. "If you had to choose one life form that has the most security it would be Shrubs. "notes United states agronomist Charles Driver.

Short-order fire wood : Ye-eb, pigeon pea, and chaya shrubs have an important role to play in providing food, but shrubs can also provide fule for cooking. As is now well known, the Third world faces severe shortages of firewood However, what is only now being recognized is that the firewood crisis can not be solved by planting trees alone. Poor people cannot afford to wait for a tree to grow,let alone the expense of plantation grown wood. To reach the |people most in need, shrubs are one major answer.

The pigeon pea has already been cited an example of a shrub that produces fuel. And there are other examples such as Dhaincha and Calliandera.Dhaincha is a shrub that is so quick-growing it can produce firewood in only six months.

A native of the Indian subcontinent, dhaincha (Sesbania bispinosa, also known as S. aculeata) has been distributed to parts of tropical Africa, Southeast Asia, China, and the west Indies. To researchers outside two or three laboratories in india and pakistan, however it is little known.

The wood is light, but it can be produced quickly and in high yield.In northern Pakistan and in Vietnam it is used as a firewood crop. Pakistanti villagers commonly use it for evaporating water form sugercane juice), it matures so rapidly that two harvests a year are possible. Vietnamese farmers grow it to fertilize rice fields and gather its stems for firewood before the rice crop is planted.

Dhaincha, too is a multipurpose species. All parts of the plant are useful, and the crop appears easy to produce on a large scale with little care or investment. Its seeds contain a water-soluble gum that produces a smooth, light coloured and elastic film useful for sizing textiles and paper and for products such as the mud used in oil drilling , it can also be used in crop rotations to fertilize and improve soil for food crops. The living plant is used to provide windbreaks, hedges, erosion control, and shade and cover for crops. Its foliage is used to increase soil fertility, especially on saline and wet soils. It also is reported to make good cattle fodder.

(P.T.O)

Dhaincha stems can be processed to provide a jute like crodage fibre, useful for items such as fishing nets, gunnysacks, and sails. They are beliced to have potential as a new source of paper, since its fibres resemble those of birch, on of the best hard woods used for pulping. In Italy, one dhaincha crop yielded 15 bone dry tons per hectare. In the tropics, where more than one crop can be harvested each year, annual production could be even higher.

Annual harvests:- Dhaincha is just one member of a genus of shrubby legumes thet deserve much greater development. In the Cameroons, villager plant another fast-growing Sesbania shrub for firewood. And more species are known in other parts of Africa and Asia. One leguminous plant(that comes in both a many-branched shrud and single-trunked tree forms) is leucaena. Leucaena leucocephala. Anative of five per cent of the protein of the Central America, this species has an irrespressible vigour and has been much in the news in recent years (see Ceres, Sept-Oct. 1979). But so far researchers have concentrated mostly on its use as a tree crop. Its value for feeding animals is not so well known.

Yet, in the lowland tropics forage can be produced more efficiently and economically from virtually anything else. Leucaena reaches almost two metres in height, and grazing cattle are nearly hidden among the bushes, with only the tops of their heads visible. Cattle relish the leaflets and young stems and often leave the bushes stripped bare. But leucaena quickly regrows new foliage, and within two weeks a "bare" field can be ready for grazing once more. So resilient is the plant that pastures near years without requiring replanting.

Leucaena leaves, similar to alfalfa in digestibility, protein content, and nutritoinal value, are particulray palatable to dairy cows, beef cattle, water buffalo, and goats. Cattle near Brisbane whose diet included leucaena gained an average of almost one kilogram of weight each day for more than 200 days. That is about twice what is normally expected from animals grazing in tropical pastures, and approaches the weight increases nonmally obtained only in feed lots. Stocking in the laucaena trials was six and more steers per hectare.

For some time researchers have worried about Mimosine, an uncommon amino acid that comprises about leaflets, but now it is Known that cattle, goats, and water buffalo in most parts of the world have stomach microbes that detoxify mimosine. Only in Australia, papua New Guinea, and perhaps a few other countries is mimosine likely to be a concern.

Leucaena, promise is for the humid tropics, but fooder shrubs find their most outstanding promise in arid lands. Here their deep roots keep them green and productive when grasses are shrvelled and desiccated. A family of shrubs with notable promise for drylands is the saltbushes.

Industrial crops : Another shrub that has been much in the headlines is jojoba (Simmondsia chinensis). The seebs of this North American desers shrub contain a vegetable oil unlike any other to be found in the vegetable kingdom. It is potentially an important industrial oil with potentail uses in quenching and cold-rolling of steel, in leather dressing, in lubricating high-speed machinery and precision instruments, and it the textile industry.

Already some 16000 hectares of jojoba plantations have been established in the arid southwestern regions of the United states and plantations are springing up in Mexico, Israel, Australia, Soth Africa, Sudan, Argentina, Costa Rica, and elsewhere.

A second promising North American shrub is Guayule (parthenium argentatum). It contain a rubber that when purified, is virtually indistinguishable from the rubber tree. A potential source of export for arid lands, it grows in poor desert siuls in otherwise unused marginal areas.

The rubber is contained with in cells thorughout the entire guayule plant, and to obtain it the whole plant is harvested, and the rubber extracteb with so or floatation in water. Yields of up to 12 per cent form improved Varieties. Guayule can be planted harvested, and processed with equipmeut already developed for other crops.

BONE SETTERS OF PUTTUR

Uttam Singh of Rjasthan took his five-year-old son with a fractured arm, jumped into a train for a 1000-km. journey to Puttur, a small town in the south Indian state of Tamil Nadu.

At Puttur railway station, he hopped into a cycle rickshaw with his son Vinod clutching his now swollen arm and writhing in pain.

Vinod is one of the hundreds of men, women and children with broken bones, dislocations, slip disc, and even paralytic polio, pouring each day into Puttur to their final destination: an unimposing single story brick building, 1.6 km. from the railway station, in this sun-swept village with a sign board that says: "home of Puttur bone setters".

Inside the brick building are seven men of the Raju family, inheritors of the century old secret of setting bones using a herb.

Uttam Singh who had heard about Puttur from his friends in Ganganagar was not troubled by the 36-hours journey from Rajasthan. "I know if I take my son to Puttur, he will be cured".

"I never believed in herbal treatment for bone fracture until I visited Puttur". wrote an American doctor in the visitors book. Japanese orthopaedic Surgeon Dr. Shigeo Niwa was similarly impressed.

"Our cure is guaranteed", said Rama Raju, only one of the Raju family holds an MBBS degree.

But no one knows for sure how the herb works. According to Rama Raju, it is a known anti-inflammatory agent that speedily reduces pain and swelling.

He said the herb also speeds up bone healing by accelerating the process of calcification, a fact confirmed by patients who have regained functions of broken limb in just 45 days againnst three months or more it takes in non-herbal, hospital treated cases.

Any thought that Puttur bone setters are a bunch of quacks vanishes as one sees an unending stream of rikshwa, carts and cars dropping patients one every two minutes from morning till dusk, seven days a week. "Our attendance is on an average 250 on week days and 350 on a Sunday", said Rama Raju.

At Puttur, patients are bandaged and sent back the same day. They pay one rupee for registration and bring their own white cloth for bandage.

It is the tradition of the Raju family not to demand fees but the bone setters accept what ever is given voluntarily. Patients pay from Rs. 5 to Rs. 20 and the poor don't pay at all.

Rama Raju has now opened herbal cure camps in six cities in Tamil Nadu and Andhra Pradesh where he treats patients once a month in rotation.

His camp in Bangalore draws more patients than a famous modern orthopaedic hospital right across, a sign that the ailing masses of India cannot be easily pushed into the 21 century.

(The Hitvada, 2 July1985)

Herbicides the natural Way :

Mr. Constantin Rebeiz and Mr Herbery Hopen have worked on the biosynthesis of chlorophyll in plants, and developed a herbicide which when sprayed onto plants overloads synthetic pathway in such a way that the plant dies.

The herbicide is based on an amino acid found in plants and hence should be safe, the scientists believe.

The herbicide is delta-aminolevulinic acid plus a chemical activator.

The scientists found out that wheat, oats and barley are not affected by the herbicide whereas several weeds are. The scientists are now looking for chemicals which will stimulate plants to produce excess amounts of ALA.

CHEAP, CLEAN WATER IN BAMBOO PIPES

A Tanzanian water reticulation programme that utilises wood and bamboo for pipes as a substitute to metal may hold the answer to one of Africa's major problem-that of providing clean water to the people.

Many ambitious water supply programmes, particularly the communally based ones, have floundered due to the high cost of metal pipes, but now a unique and pioneering wood and bamboo reticulation system widely used in Tenzania may provide the answer.

An international conference on water and waste engineering for developing countries, held in Tanzania was told that over 200 hectares had been put under irrigation using wood and bamboo pipes. The mateials are both cheap and ideal and are easily available in most African countries.

The conference drew 130 participants from 16 countries, including 12 African nations.

It was called to review how water and waste engineering could work with people towards a speedy provision of clean water and better sanitation.

According to a paper presented at the conference, the achievements in water supplyis visible than in sanitation. It noted that regional water masterplans have so far been completed for 17 out of the total 20 regions in mainland Tanzania. Likewise, there are now a total of 3,700 boreholes in Tanzania that use simple technology.

Sanitation system seems to have been neglected with the result that most urban areas in the country have got poor sanitary facilities. For instance, in 1975 only eight per cent of the urban population had access to public sewers and 54 per cent either a pit latrine, septic tank or a soakway pit.

And by 1980, the urban population connected to sewers was 12 per cent while 81 per cent had an on-site disposal facility. About seven per cent have no proper facility at all.

Costs of implementation have normally been singled out as the major contributing factor that hamper sanitation projects. As a result, Government subsidies for rural sanitation where over 80 per cent of Tanzanians live has remained almost nil.

The conference said rural water supply and sanitation project should be planned hand in hand to minimise the costs of support, promotion and health education. Good quality latrines were singled out as cheap, suitable for self-help construction using local materials despite their short life-span of 20 years.

A good latrine costs about Rs. 1,500 and is the only sanitation facility that does not need trained-people to maintain it. It was suggested at the conference that the development of reliable water supply services that can be locally produced, installed and maintained at a reasonable price will be a major step towards providing reliable, safe drinking water supply to the rural people.

(Source : The Hindu Dt.1-7-85)

Drilling wells with bamboos

A Japanese telvision station is paying for 13 Japanese engineers to teach Zambia villagers how to drill wells, using bomboos.

This traditional method to digging wells is called kazusaberi. The technique enables the digging of wells as deep as 500 ms, without the use of electricity, fuel oil, drilling rigs or pumps.

The man behind the damboo invasion is 64 year-old Seizi Kondo.

The only thing needed to dig a kazausa bori well is a length of bomboo which is connected to iron head, and to a large flywheel made from bomboo and timber. The bamboo drill piece is driven inot the ground using only anpower, and acts as a conduit once water is struck.

Within five days of arriving in Zambia, Mr. Konodo's team had sunk a well in a remote Wenela village in Mongu District, 583 kms west of Lusaka. The well now supplies water to the villagers, who are ready to teach the techniques which they have mastered to people in other villages.

The Telegraph
Date : 20-12-1985

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points to ponder

Wipe Tear From Every Eye : PM

Prime Minister Rajiv Gandhi in his recent address to the special session of International Labour Organization at Geneva said we are still only talking about those who are employed, " What about the unemployed ? What about those who are unorganised as the vast majority of workers in developing countries are ?"

Mr. Gandhi said organised labour constituted only a small part of the total labour force in the developing countries. There are millions who earn less than the organised workers and in addition there are millions more without work or are grossly underemployed.

"My question is : what more can the ILO do to make these segment of labour a major focus of its activity ?" Poverty alieviation, Mr. Gandhi said, remains the core of India's strategy for development. 'We are creating a policy environment conducive to faster growth, to infusion of modern technology and to higher productivity."

As enormous range and complexity of issues are inherent in the management of the dramatic changes in technology for the welfare of the poor in developing countries. "The development process and what it does to those without the protective umbrella of organised action must increasingly claim our attention." The work of the ILO for the weak, the unemployed and the unorganised, Mr. Gandhi hoped, would be further enlarged.

Social Cost of Struggle Against Inflation Has Been High

The social cost of the now largely successful struggle against inflotion has been high and the time may have come for a careful reflation, the Director-General of the International Labour Office told the UN Economic and Social Council on 10 July. Employment should become the central policy objective in the decade to come, he said.

The world, Mr. Firancis Blanchard said, head to face the " brutal truth " that the signs of apparent revival of the global economy had not been accompanied by an improvement in the employment situation. Noting that the growth in 1984 of the Gross National Product of the market economy countries had reached five per cent, the highest level since 1976. Mr. Blanchard pointed out that in the same year unemployment had reached over 30 million in the OECD countries.

Proportionately, unemployment of young persons was double that of adults in the seven most industrialised countries and the duration of unemployment for all categories of worker had lengthened.

Every day no less than 20,000 new jobs would need to be created over the next five years if the number of unemployed in 1989 is to be reduced to the pre-revival level of 1979.

Even if one takes the somewhat optimistic rate of three per cent growth for the remainder of this decade, one in ten workers in Europe would be unemployed in 1990.

In the developing countries the benefits from the high growth rates during the 1960s and 1970s were wiped out by the rapid population growth and by the average cut in incomes arising from the strict measures taken in many countries to improve the balance of payments and to face the debt problem. The price paid by these countries for the revival in the industrialised countries was heavy too as income from exports fell.

Global employment through A. T.

The International Labour Organization's newly – formed Advisory Committee on Technology, in its first session discussed the blending of new technologies with traditional activites and the socio–economic impact of new technologies.

An ILO report notes that 20 million jobs are required a year just to prevent the global poverty and unemployment problem from worsening. If the technologies currently operated in developing countries were used, the cost of creating oue job would range from US Dollar 15,000 to 30,000

(Contd from page 1)

from abroad the servicing of which has now become a load.

The question is can we have greater productivity without adding to the disparity level that already exists. This question has not been answered. What has been done in the field of poverty amelioration are relief measures whereby the poor can be fed and marginally looked after. The most recent (March 1986 report of World Bank named 'Poverty and Hunger' issues and options for food security in Developing Countries' says "Any pelicies that can simultaneously promote both efficient economic growth and raise the incomes of the poor should be given high priority. If that means shifting resources from large farms to small farms, from export crops to food crops, from industry to agriculture or from capital intensive to labour intensive activities such shifts should be encouraged as part of food security policy." This unfortunately cannot be implemented where the industrialization compulsion is great. The percentage of people Below Poverty Line (BPL) in our country have remained mich the same and though it fluctuates with vagaries of seasons and crops it remains around 40% of the decent living, eventhough in the last 30 years the industrial output went up 5 times, agricultural output has doubled, where wheat production went up 5 times, sugar 3 times and cotton 2 times the distributive justice could not be assured.

If the lessons of the 20 century industrialization are to be learnt and the Third World countries instead of copying a set pattern try to follow an alternate path which is emerging from the compulsions of the situation a right orientation would be possible. The depletion of fossil fuels has made the world to think of renewable sources of energy. The pollution of the environment due to the consumeristic trends increasing adnauseum forces us to think of limiting our wants. The annihilation of numerous species of flora and fauna inhabiting the globe due to industrial expansionism makes the conservationists and long range thinkers cry halt to the mad rush. The growing tensions between the nations due to competative trends in economies leading to wars makes imperative that a cooperative commonwealth be created on the globe. The human personality which craves for happiness, freedom and expression in all fields both as an industrial and as a collective gets restricted with present urbanised habitat and craves for open nature and war
human relationship. Al
and many more require
economy to develop wh
common man will feel
breathe and happier to
is these economic forc
should blossom forth.

Devendra Kumar

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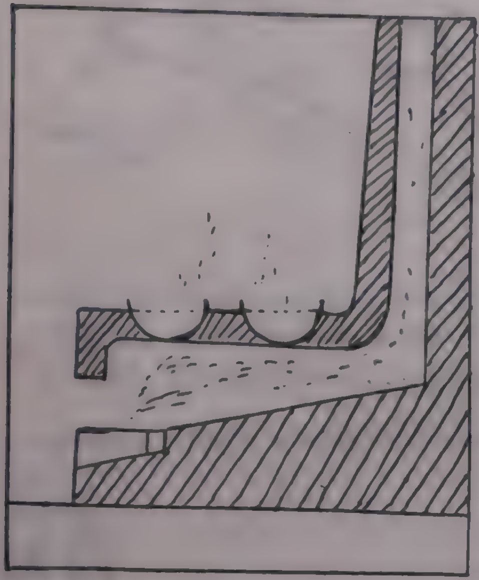
DIEP
22/7

23. EDITOR
CFTRI NEWS LETTER
CENTRAL FOOD TECHNOLOGICAL
RESEARCH INSTITUTE
MYSORE - 570013
KARNATAKA

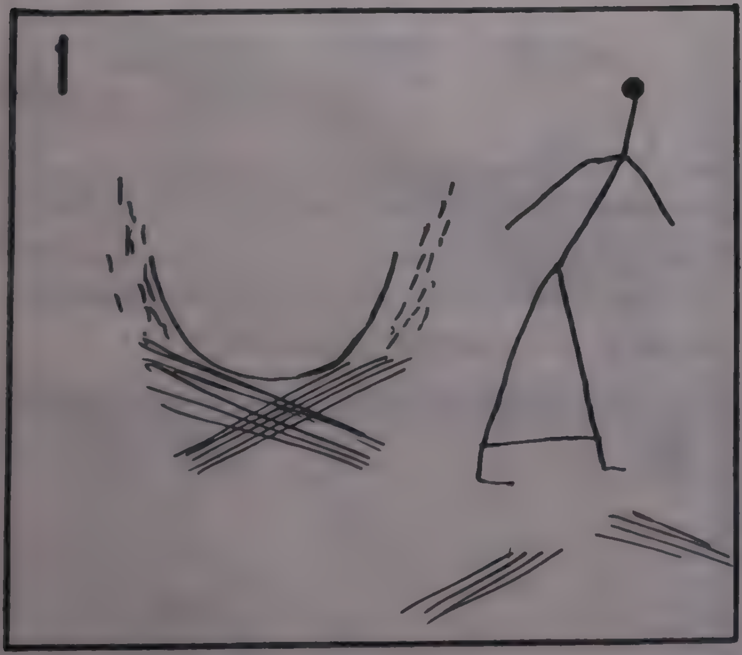
Published by: Devendra Kumar on behalf of Science or Villages, Wardha, Editor : Devendra Kumar,
Managing Editor: Vibha Kumar.
Editorial Office: Centre of Science for villages. Magan Sangrahalaya, Wardha 442001, Maharashtra,
Printed at : Lok Seva Printing Press, Wardha.



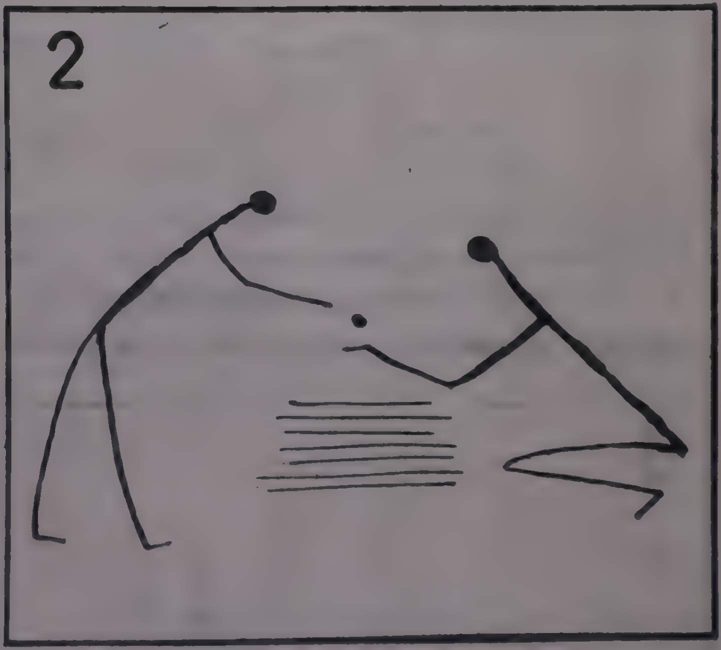
A HEARTH THAT USES LESS FUEL

YONA FRIEDMAN
42 Boulevard Pasteur,
75015 Paris - France

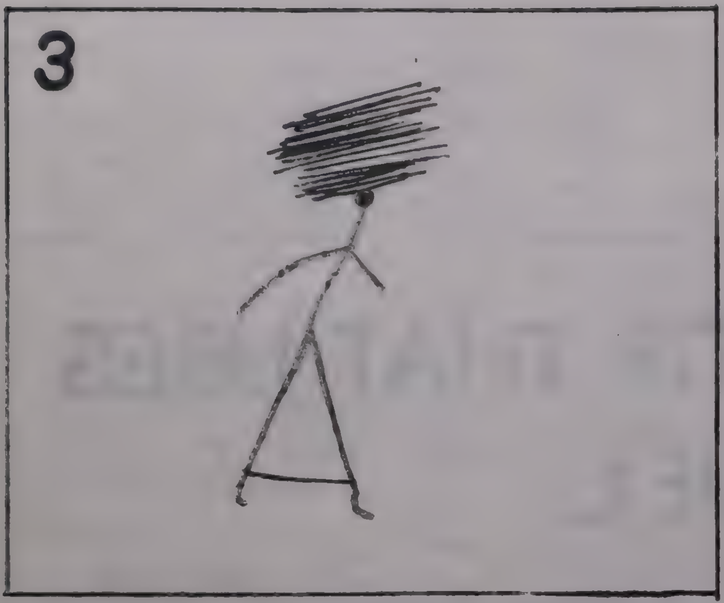
You can save your fuel by designing a longish hearth having a little raised fire-place and a gentle slope.



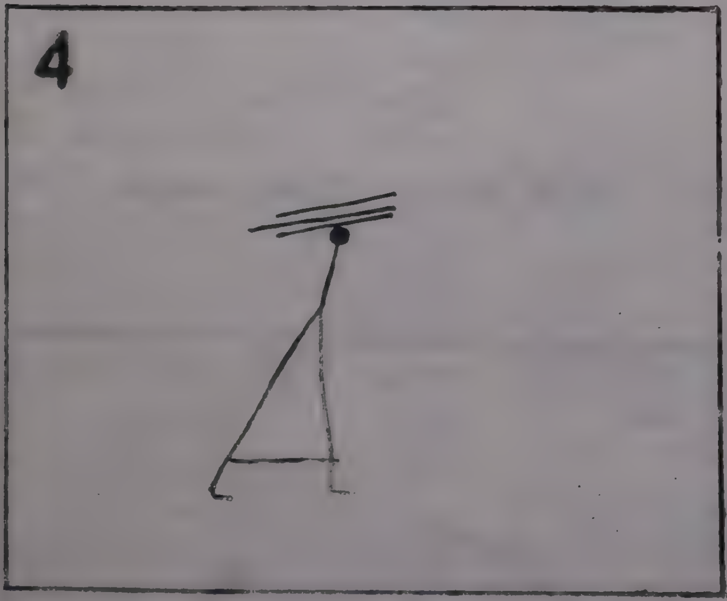
For cooking your meals.
you use fuel which is always expensive ......



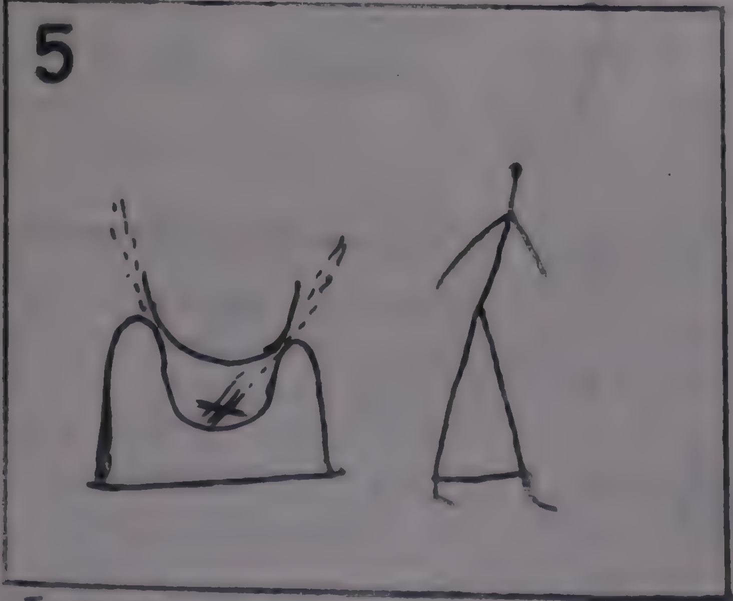
.... in terms of cash.



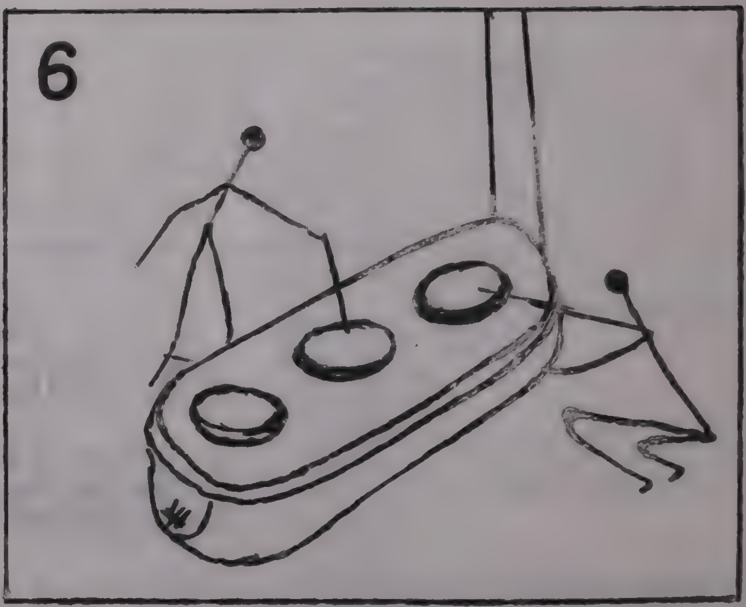
or of labour



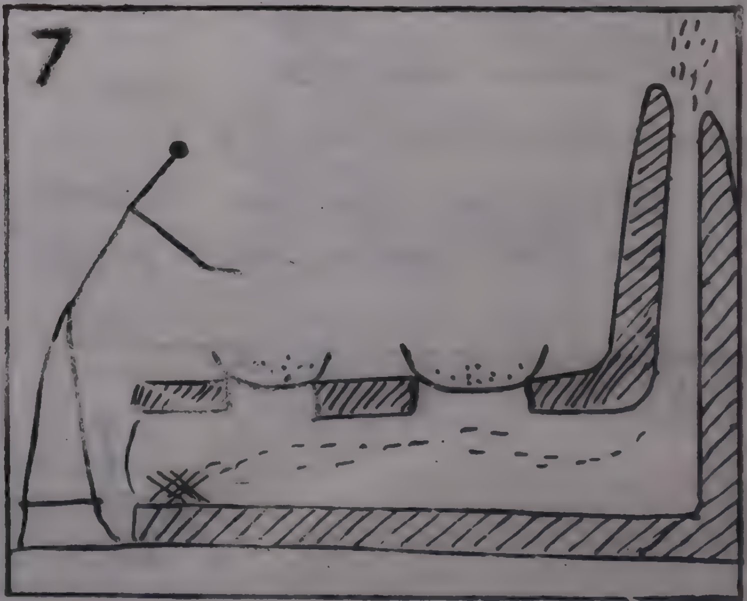
If you could reduce the quantity of fuel needed. You could save both cash and labour.



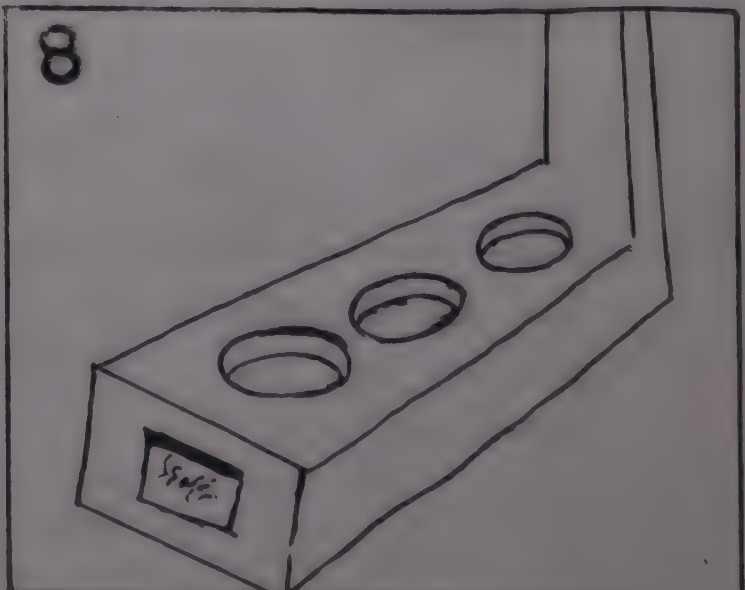
To reduce the quentity of fuel used to cooke the same quantity of meal.
You should improve the hearth you use



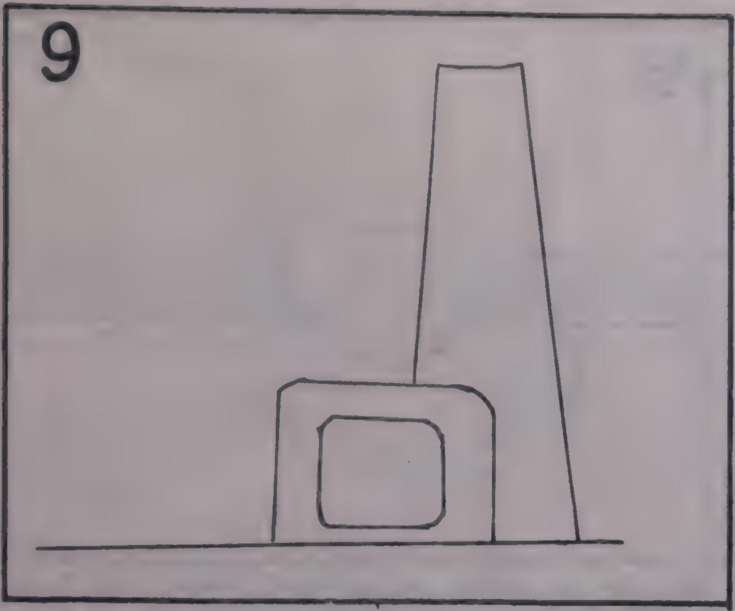
You can cook meal in several posts even on a smaller fire.



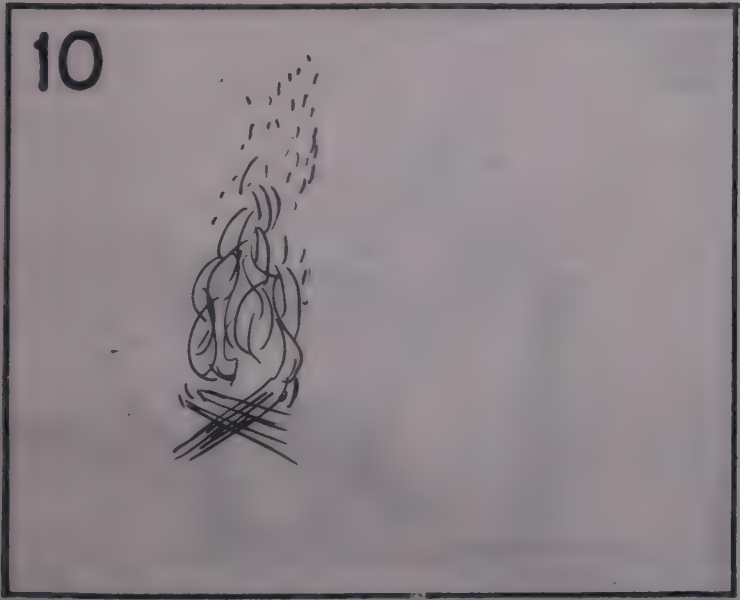
if you make your hearth in the form of a long horizontal channel.



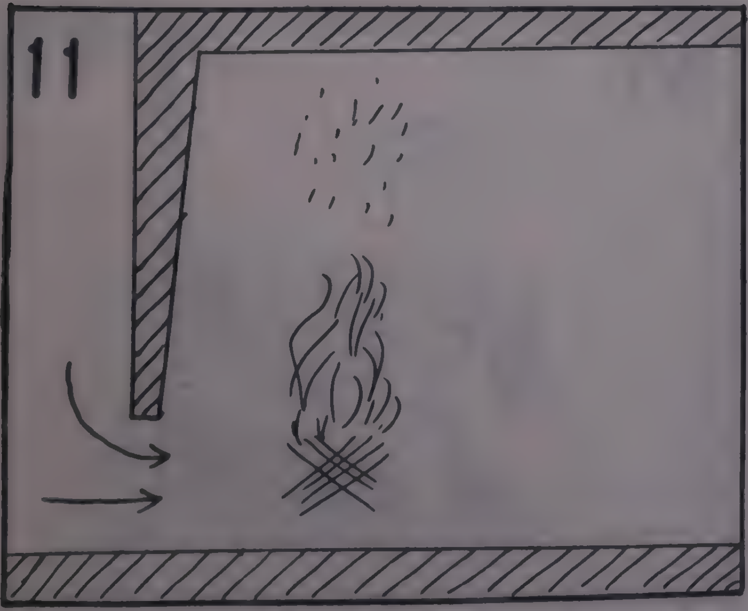
Wherein the hot flame goes from the fire place.
toward the smoke outlet..



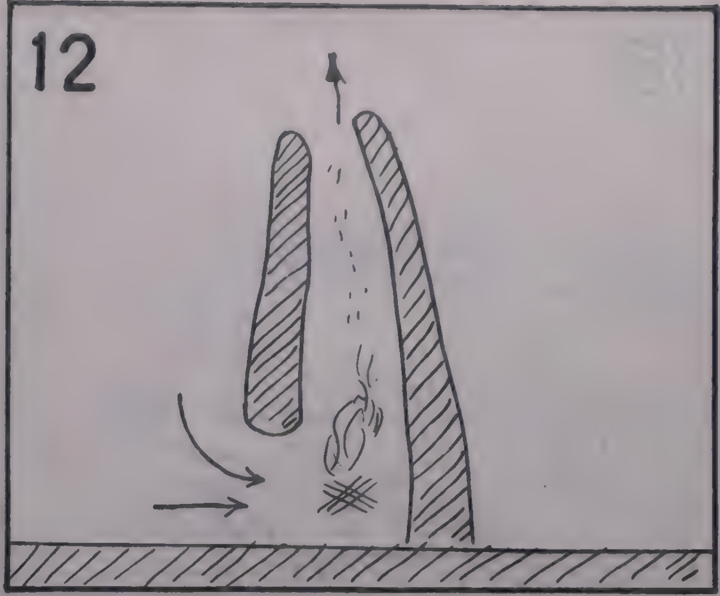
Let us see how does such a hearth work.



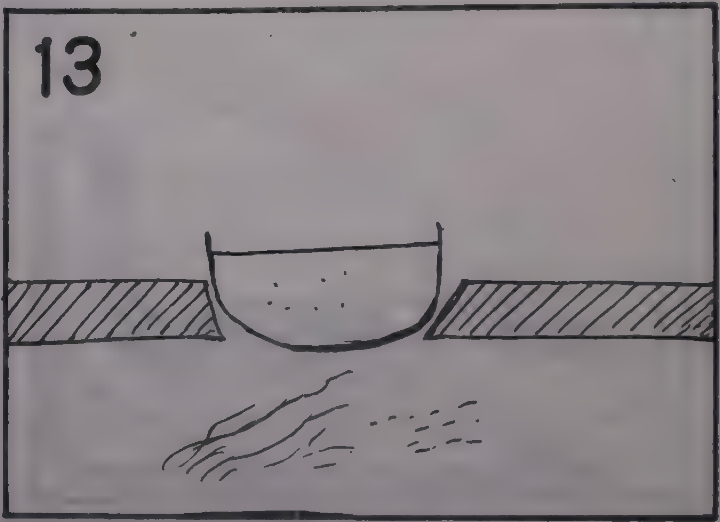
You have first a place where the fire burns.



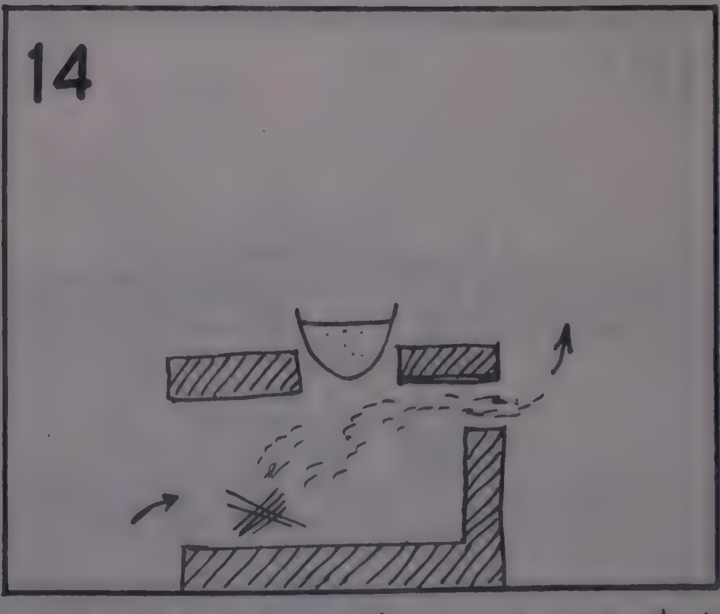
For the fire an air supply is necessary, and so near this fire is an air-inlet.



The hot smoke and the flames of the fire tend toward a smoke-outlet. The draft between air-inlet and smoke-oullet makes the fire burn faster or slower.

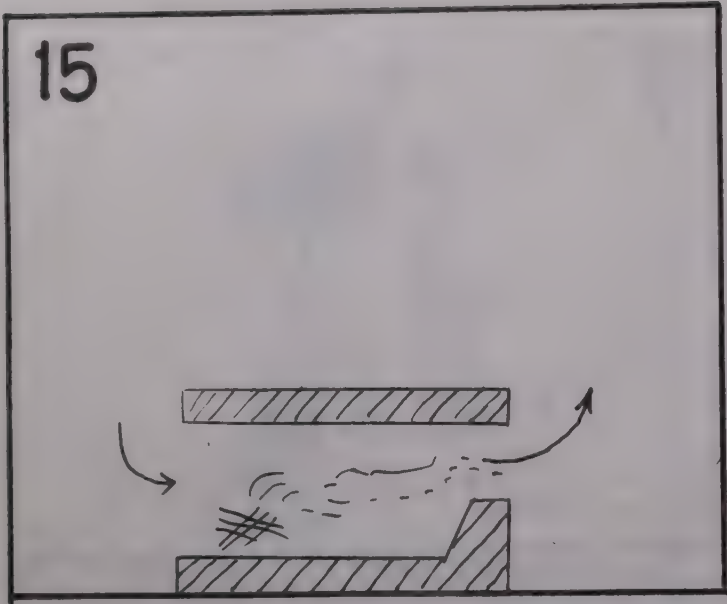


The pots with meals are heated-by the flames and ....



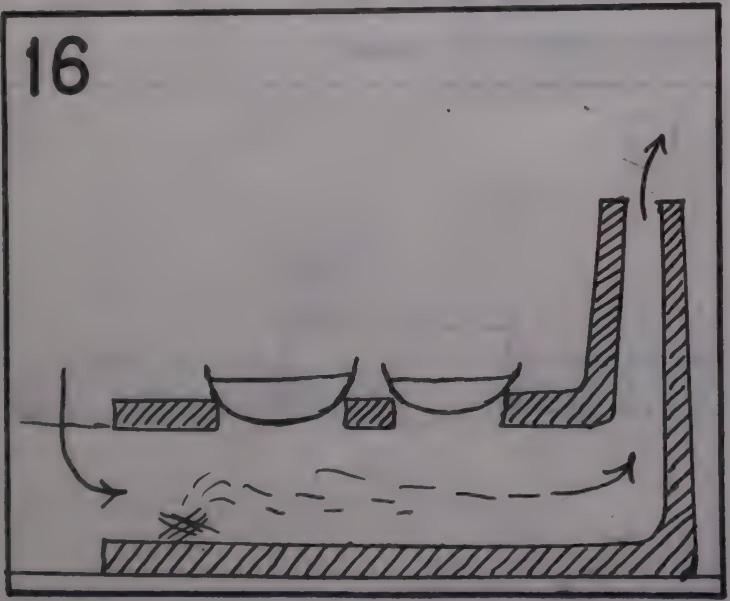
..... by the hot smoke gases generated by the fire.

15



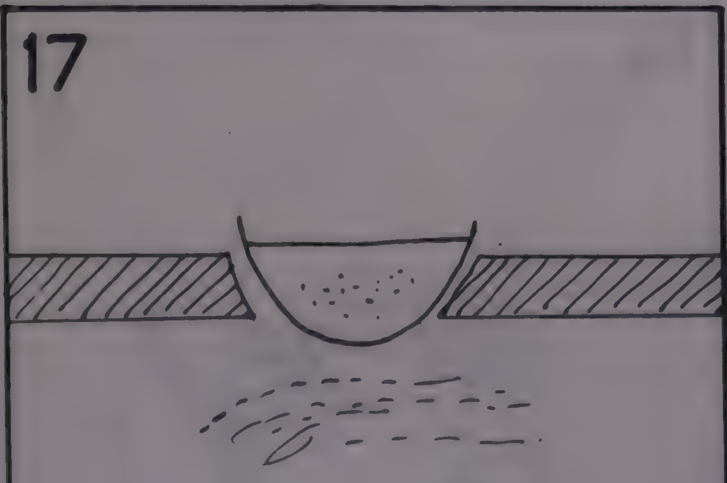
Flames and smoke gases stream toward the chimney.

16



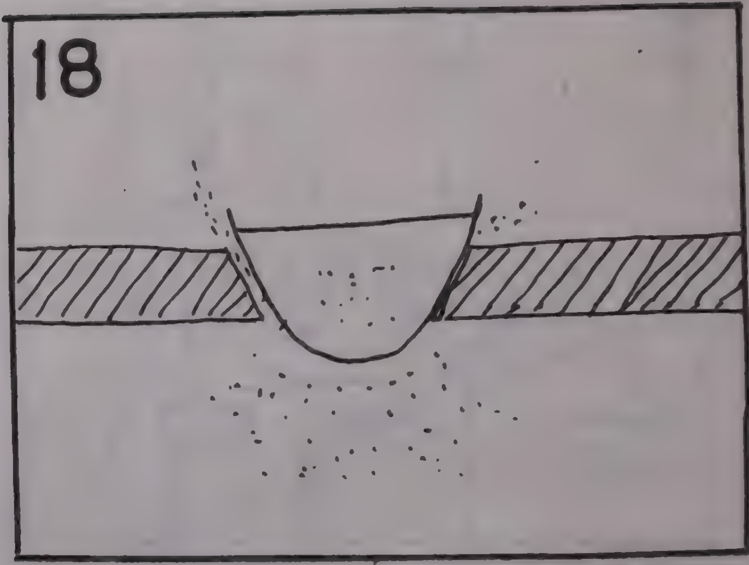
Your ~~pots~~ pots , in order to get heated, have to be placed on the route of the flames and the gases.

17



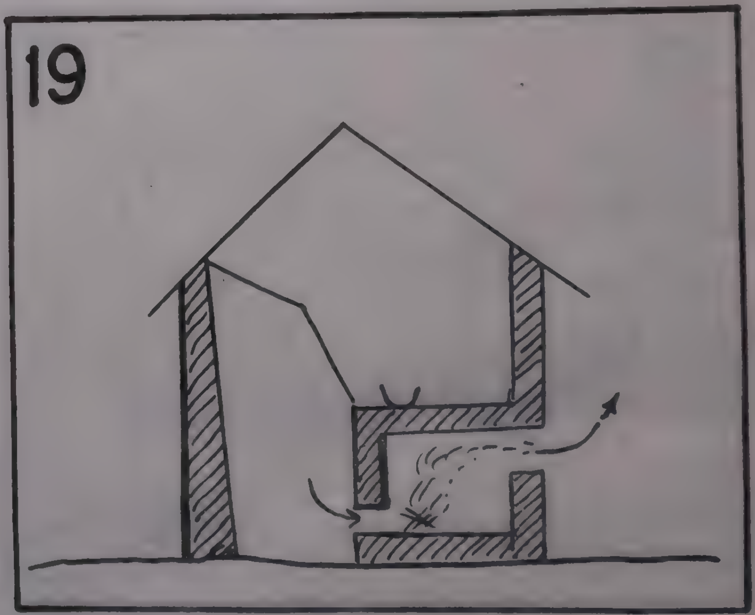
It is important that the pots should expose the largest possible surface to the flames and the hot gases.

18



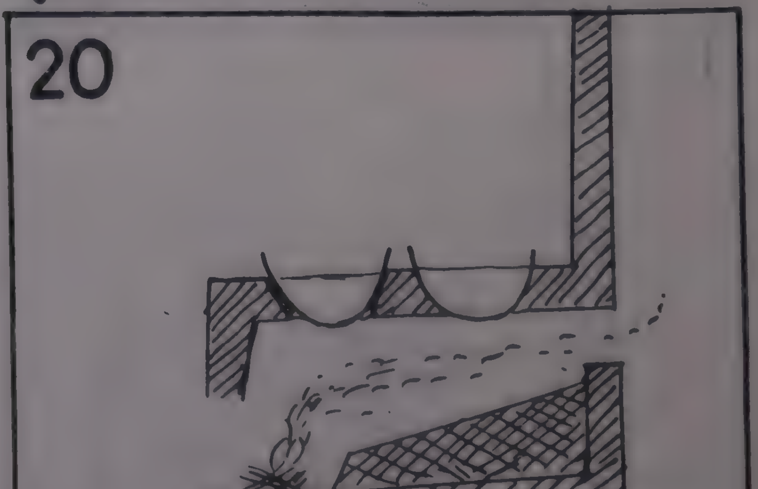
And it is also important that the hot gases. should not escape between the pot and the hearth.

19



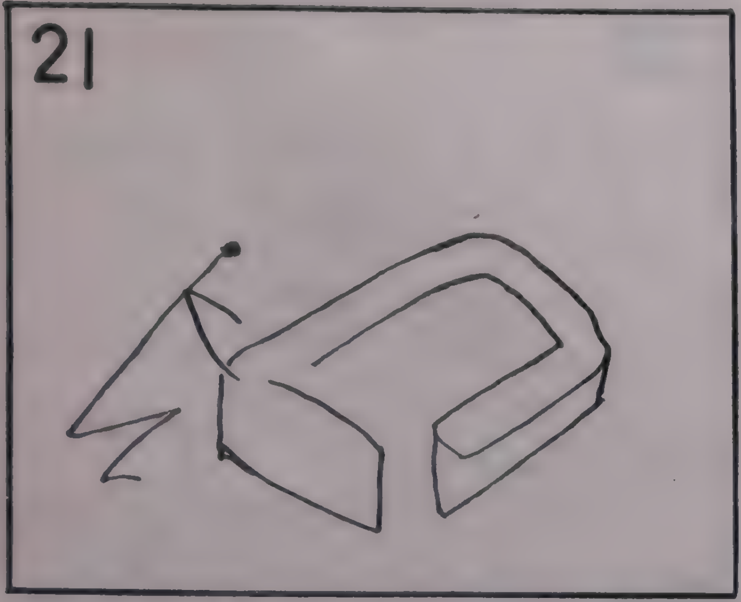
The smoke-outlet (Chimney) shoud lead outside the house, and the air-inlet should be easy to regulate.

20



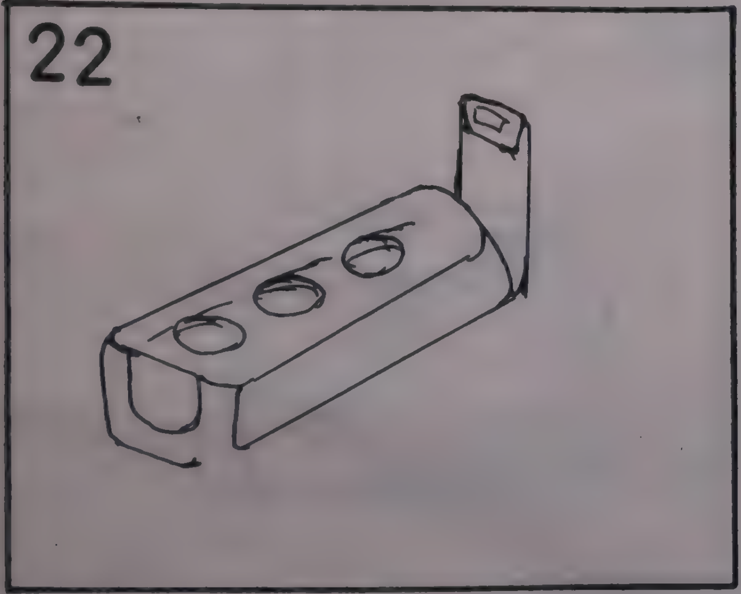
As for the heat-channel leading from inlet to outlet, it should rise in a gentle slope toward the outlet.

21



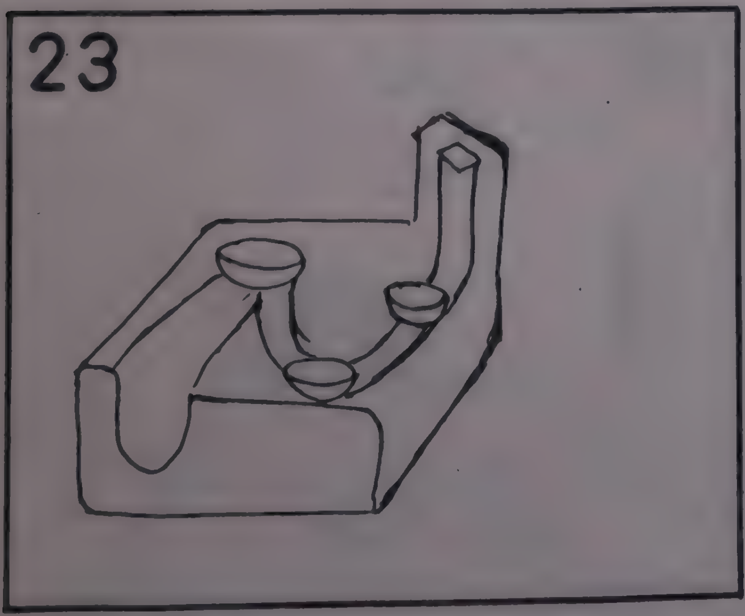
You can build such a hearth out of dry mud.

22



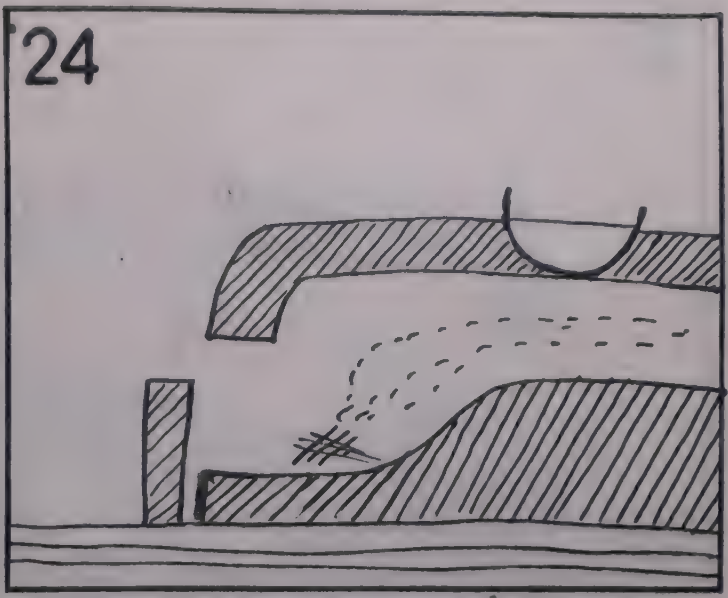
The heating channel can be straight ..... or

23



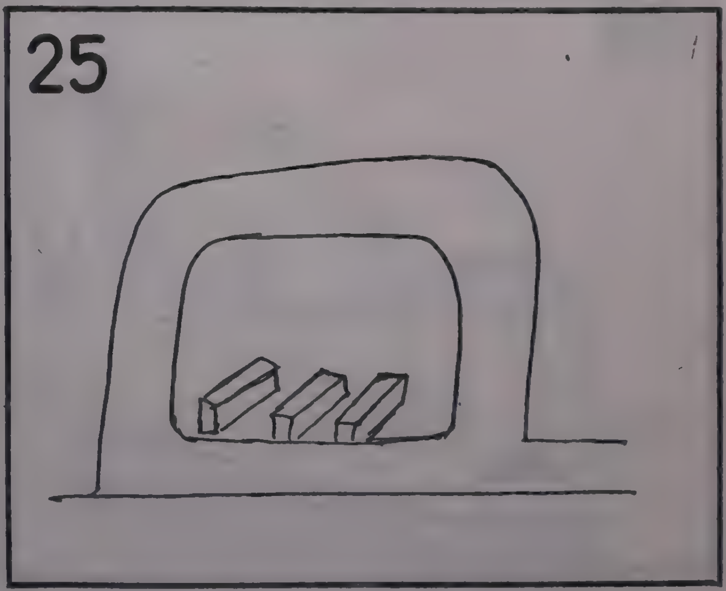
--- or serpentine.

24



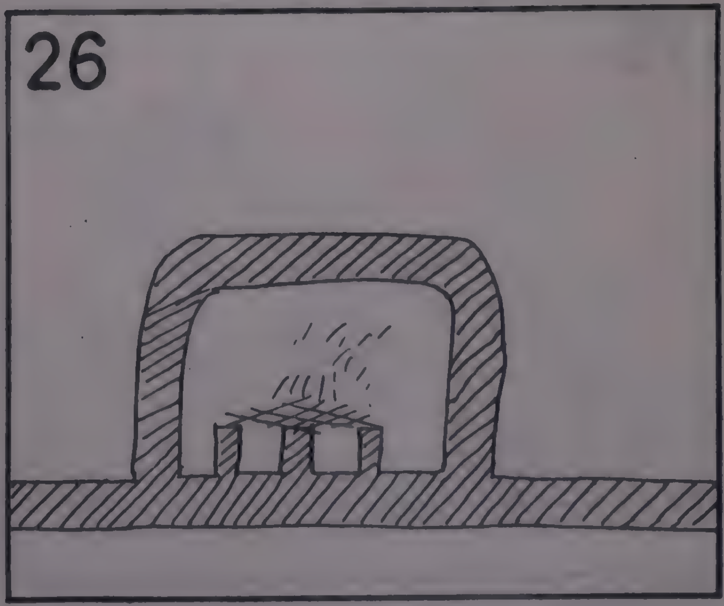
The air-inlet can be regulated by obstructing it more or less by means of mud blocks.

25

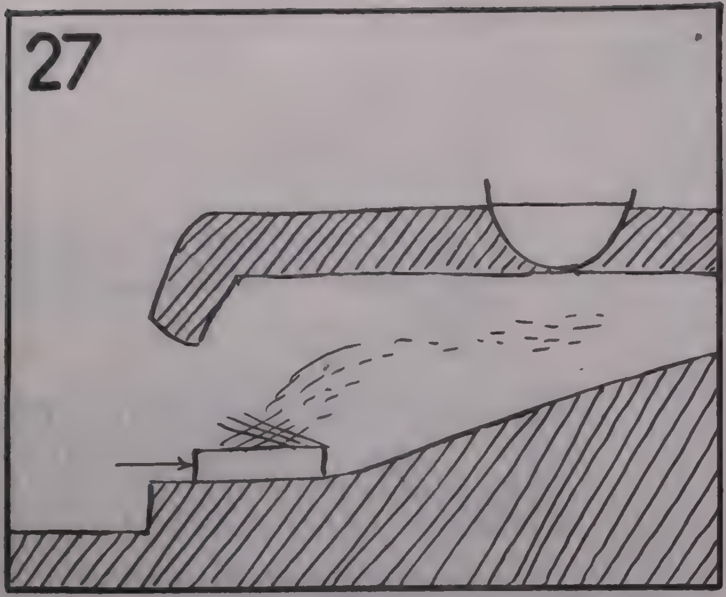


The fire-place can work better if it is slightly raised, for example on a few bricks.

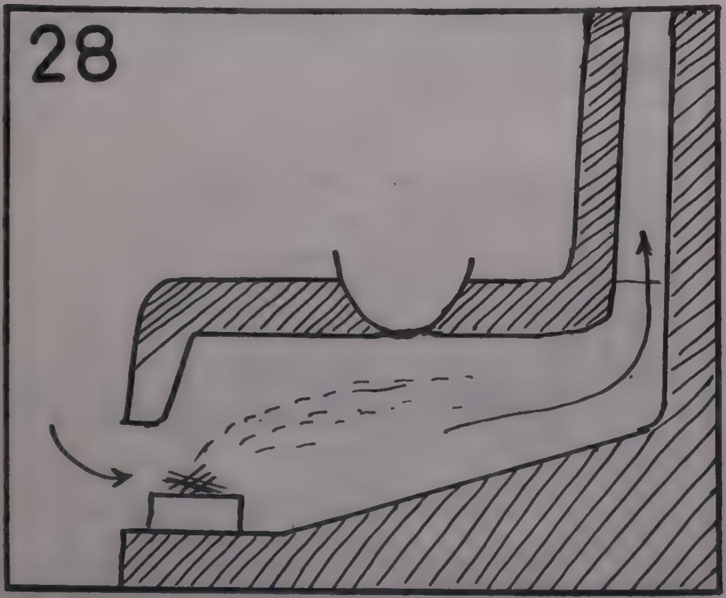
26



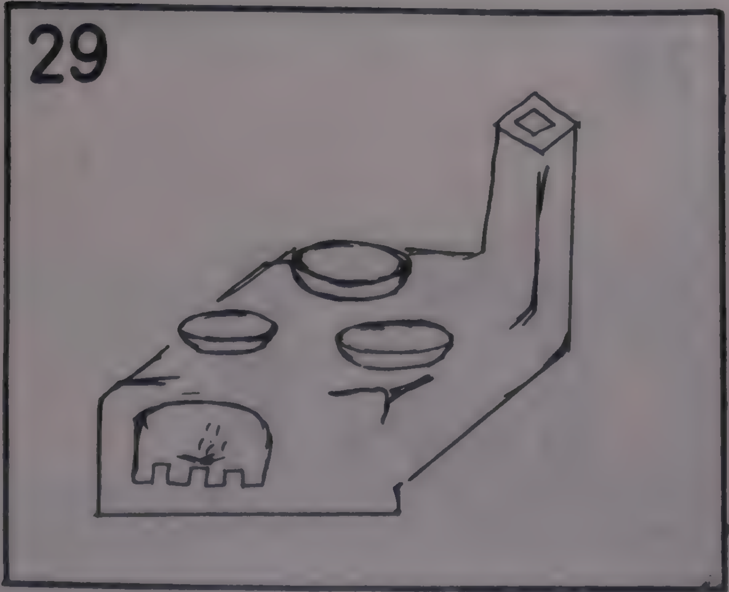
in order to let the ashes fall down to the bottom.



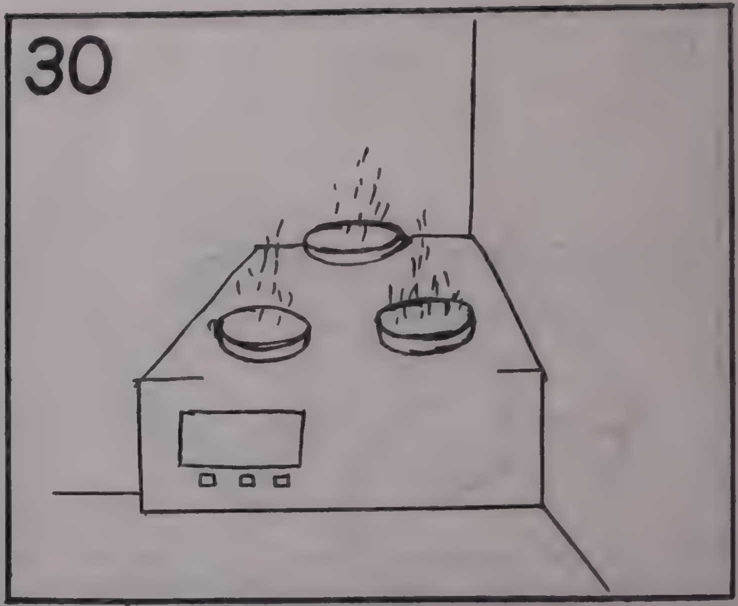
Such a disposition facilitates air passage from under the fire.



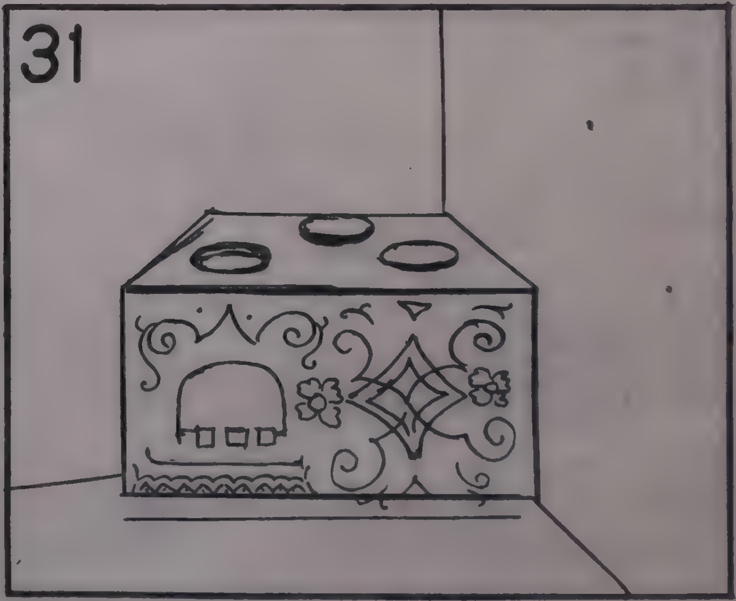
The draft becomes better, and the fire smokes less.



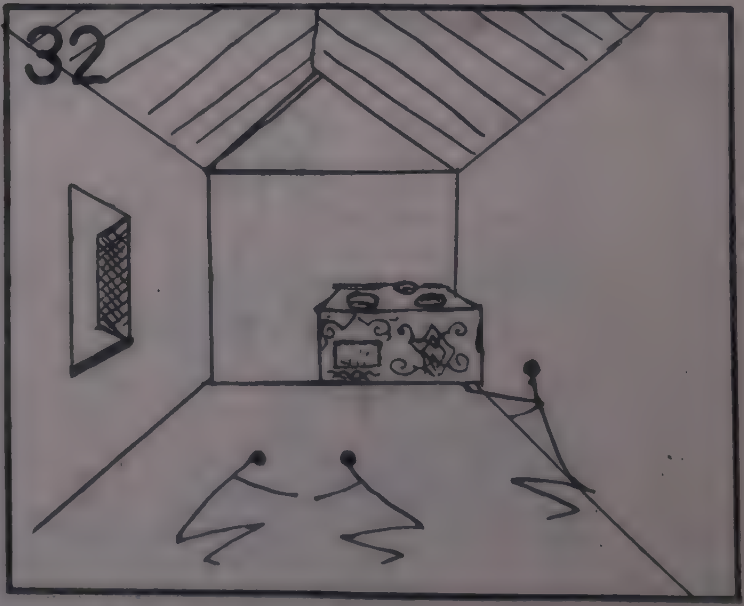
An earthen hearth – a chula built this way – keeps the heat longer.



and thus keeps your meal warm.



If the hearth is decorated with painting .... or with mud reliefs, ...



.... it might be the pride of your house.

Source : INVENTION Intelligence.